Unit Conversion Practice Worksheet

Prefix	Symbol	Multiple/Fraction
giga-	G	$1{,}000{,}000{,}000 = 1 \times 10^{9}$
mega-	M	$1{,}000{,}000 = 1 \times 10^{6}$
kilo-	k	$1{,}000 = 1 \times 10^{3}$
Basic unit: meter, gram, liter, second		
deci-	d	$0.1 = 1 \times 10^{-1}$
centi-	c	$0.01 = 1 \times 10^{-2}$
milli-	m	$0.001 = 1 \times 10^{-3}$
micro-	μ^{*}	$0.000\,001 = 1 \times 10^{-6}$
nano-	n	$0.000\,000\,001 = 1 \times 10^{-9}$

For questions 1-9, be sure to include units in your answers!

1. **Example:** How many grams are in 1 kilogram? **1000 grams**
2. How many grams are in 1 milligram?
3. How many meters are in 1 megameter?
4. How many meters are in 1 centimeter?
5. How many liters are in 1 gigaliter?
6. How many liters are in 1 deciliter?
7. How many seconds are in 1 millisecond?
8. How many seconds are in 1 microsecond?
9. How many seconds are in 1 nanosecond?

The scientific abbreviations for each metric system base unit are given below:

Base Unit	**Abbreviation**	**Example with milli- prefix**
meter	m	mm
gram	g	mg
liter	L	mL
second	s	ms

For questions 10-13, calculate the result and abbreviate the units.

10. **Example:** How many mg are in 1 g? **(answer shown below)**

Step 1: Set up the ratio → $(1\ mg\ /\ 0.001\ g)\ \div\ (x\ /\ 1\ g)$

Step 2: Cross-multiply → $(1\ mg)(1\ g)\ =\ (0.001\ g)(x)$

Step 3: Isolate x → $(1\ mg)(1\ g)\ /\ (0.001\ g)\ =\ x$

Step 4: Divide and cancel → $1\ mg\ /\ 0.001\ =\ x\ \rightarrow\ x\ =\ 1000\ mg$

Step 5: Write a complete answer: **There are 1000 mg in 1 g**

11. How many nanoseconds are in 1 second?

Step 1: Set up the ratio →

Step 2: Cross-multiply →

Step 3: Isolate x →

Step 4: Divide and cancel →

Step 5: Write a complete answer:

12. How many centimeters are in 1 meter?

Step 1:

Step 2:

Step 3:

Step 4:

Step 5:

13. How many microliters are in 1 liter? Show the steps for full credit!

For questions 14-17, calculate the unit rate (denominator = 1 unit):

14. **Example:** Calculate 10 mg / 50 mL = **0.2 mg / 1 mL = 0.2 mg/mL**

15. Calculate 46 m / 10 s =

16. Calculate 625 L / 228 s =

17. Calculate 177 g / 32 µL =

For questions 18-20, convert the first unit rate to the specified unit rate:

18. **Example:** Convert 5 mg/mL to mg/µL **(answer shown below)**

$$5\ mg / mL \bullet 1\ mL / 1000\ \mu L = 5\ mg / 1000\ \mu L = 0.005\ mg / \mu L$$

19. Convert 0.005 mg/µL to µg/µL

20. Convert 299,792,458 m/s (the speed of light) to Mm/s

Challenge Questions:

21. Convert 1234 km/hr (the speed of sound) to m/s

22. How many times faster is the speed of light than the speed of sound? Connect your result with your understanding of thunder and lightning.

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Bonus! Remember to show your work.

23. A typical adult has about 5 liters of blood volume. About half of the blood is serum (fluid) and the other half is cells. The cells are divided into red blood cells (RBCs, which carry oxygen) and white blood cells (WBCs, which fight disease). Each microliter of blood (serum and cells together) contains roughly 5,000,000 RBCs and 10,000 WBCs. How many RBCs and WBCs does the typical adult have in circulation at any time?

24. The Peregrine Falcon is the fastest animal on Earth. It can fly at a top speed of 242 miles per hour. Convert to km/day. **1 inch = 2.54 centimeters and 1 mile = 5,280 feet**

25. The distance around the Earth (the circumference) is 40,075 km. How many days would it take a Peregrine Falcon to complete one trip around the Earth?

26. The three-toed sloth is the slowest mammal on Earth. It moves at 0.003 miles per hour. Convert to meters/hr.

27. The average two-lane road is 7.4 meters wide. How many hours would it take a sloth to cross the road?