

Liquid Volume and Mass

Liquid volume (how much liquid fits in a container) is measured in liters and milliliters. Mass (how heavy something is) is measured in grams and kilograms.

| Quantity | Conversion |
|---------------|--------------------------------------|
| Liquid volume | 1 liter (L) = 1,000 milliliters (mL) |
| Mass | 1 kilogram (kg) = 1,000 grams (g) |

Key Concepts

- Liquid volume** is the amount of liquid a container holds. Big containers use *liters* (L); small amounts use *milliliters* (mL).
- Mass** is how much matter an object has. Light objects are measured in *grams* (g); heavy objects in *kilograms* (kg).
- Conversions: $1 \text{ kg} = 1,000 \text{ g}$; $1 \text{ L} = 1,000 \text{ mL}$. Multiply to go from the bigger unit to the smaller; divide to go the other way.
- You can add or subtract amounts in the same unit, but never mix units (kg with g, or L with mL) until you convert.


Worked Examples

① Would you measure the mass of a cat in grams or kilograms?

 A cat is fairly heavy — typically 4 to 6 kilograms. Measuring in grams would give a huge number (4,000 to 6,000), which is awkward. *Kilograms* is the right unit.

 **Answer:** *Kilograms*

② A jug holds 4 L. You pour 1 L into a glass. How many liters remain?

 Subtract liters from liters: $4 - 1 = 3$ liters left in the jug. (Same unit on both sides, so no conversion needed.)

 **Answer:** *3 L*

③ Convert 2 kg to grams.

 Going from a bigger unit (kg) to a smaller one (g), so multiply. $1 \text{ kg} = 1,000 \text{ g}$, so $2 \text{ kg} = 2 \times 1,000 = 2,000 \text{ g}$.

 **Answer:** *2,000 g*

Practice Problems

Convert, add, or pick the best unit.

- | | |
|----------------------------------------------------|-------------------------------------------------------|
| 1. Pencil mass: g or kg? _____ | 7. $4 \text{ kg} - 1 \text{ kg} = ? \text{ kg}$ _____ |
| 2. Dog mass: g or kg? _____ | 8. Grape mass: g or kg? _____ |
| 3. $3 \text{ kg} = ? \text{ g}$ _____ | 9. $7 \text{ L} - 2 \text{ L} = ? \text{ L}$ _____ |
| 4. $5,000 \text{ g} = ? \text{ kg}$ _____ | 10. $9,000 \text{ g} = ? \text{ kg}$ _____ |
| 5. Bathtub capacity: L or mL? _____ | 11. Watermelon mass: g or kg? _____ |
| 6. $6 \text{ L} + 3 \text{ L} = ? \text{ L}$ _____ | 12. $10 \text{ L} + 5 \text{ L} = ? \text{ L}$ _____ |

Study Tips

-  Reach for kilograms and liters for big amounts, grams and milliliters for small. The unit should produce a comfortable number.
-  Always convert to the same unit before adding or subtracting. 2 kg and 500 g should become 2,000 g and 500 g (or 2 kg and 0.5 kg) first.
-  Estimating is a great sanity check. A bottle of water is roughly 0.5 L; a feather has a mass of just a few grams.

Word Problems

1. A fish tank holds 20 liters of water. Kai pours in 8 liters, then adds 5 more liters. How many more liters does he need to fill the tank?

Answer: _____

2. A bag of flour has a mass of 2 kg. Mrs. Ruiz uses 500 g for a recipe. How many grams of flour are left?

Answer: _____

Answer Key — with Friendly Explanations**Practice Problems**

1. A pencil is light — grams is right.

 **Answer:** *Grams*

2. A dog is heavier — kilograms.

 **Answer:** *Kilograms*

3. $3 \times 1,000 = 3,000$ g.

 **Answer:** *3,000 g*

4. $5,000 \div 1,000 = 5$ kg.

 **Answer:** *5 kg*

5. Bathtub holds a lot — liters.

 **Answer:** *Liters*

6. $6 + 3 = 9$ L.

 **Answer:** *9 L*

7. $4 - 1 = 3$ kg.

 **Answer:** *3 kg*

8. A grape is light — grams.

 **Answer:** *Grams*

9. $7 - 2 = 5$ L.

 **Answer:** *5 L*

10. $9,000 \div 1,000 = 9$ kg.

 **Answer:** *9 kg*

11. A watermelon is heavy — kilograms.

 **Answer:** *Kilograms*

12. $10 + 5 = 15$ L.

 **Answer:** *15 L*

Word Problems

1. $8 + 5 = 13$ L; $20 - 13 = 7$ L.

 **Answer:** *7 L*

2. 2 kg = $2,000$ g; $2,000 - 500 = 1,500$.

 **Answer:** *1,500 g*

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