

Volume and Measurement Conversion: practice solutions, Grade 5 – download the PDF

Written solutions to the chapter problems. Check each step, then correct yourself.

1 Count the cubes



- a. One layer is 3 cubes by 2 cubes: $3 \times 2 = 6$ cubes.
- b. There are 2 layers.
- c. $6 \times 2 = 12$. The volume is **12 cubic units**.

2 Square units or cubic units?



- a. The floor is a flat surface, so you measure its area in **square units** (for example square feet).
- b. Sand fills a solid space, so you use **cubic units** (cubic feet).
- c. A rope has one dimension, so you use **linear units** (feet or meters).
- d. Space inside a box is volume, so **cubic units**.

3 Apply the formula



$V = l \times w \times h = 7 \times 3 \times 4$. First $7 \times 3 = 21$, then $21 \times 4 = 84$.

The volume is **84 cm^3** .

4 A cube-shaped box



- a. $V = 5 \times 5 \times 5 = 125$. The box has a volume of **125 in³**.
- b. $V = 10 \times 10 \times 10 = 1,000$. The block has a volume of **1,000 cm³**.

5 Customary lengths



- a. Feet to inches, multiply: $4 \times 12 = 48$, so 4 ft = **48 in**.
- b. Yards to feet, multiply: $5 \times 3 = 15$, so 5 yd = **15 ft**.
- c. Inches to feet, divide: $36 \div 12 = 3$, so 36 in = **3 ft**.
- d. $2 \times 5,280 = 10,560$, so 2 mi = **10,560 ft**.

6 Metric lengths



- a. $7 \times 100 = 700$, so 7 m = **700 cm**.
- b. $3 \times 1,000 = 3,000$, so 3 km = **3,000 m**.
- c. $60 \div 10 = 6$, so 60 mm = **6 cm**.
- d. $4.5 \times 100 = 450$, so 4.5 m = **450 cm**.

7 Read the line plot



- a. Three $\times$ are above $\frac{3}{4}$, so $\frac{3}{4}$ in appears most often.
- b. Three leaves at $\frac{3}{4}$ in and one at 1 in are longer than $\frac{1}{2}$ in: **4 leaves**.
- c. $1 - \frac{1}{4} = \frac{3}{4}$. The difference is $\frac{3}{4}$ in.

8 Find the missing height



$96 = 8 \times 6 \times h$, so $96 = 48 \times h$.

$h = 96 \div 48 = 2$. Check: $8 \times 6 \times 2 = 96$.

The height is **2 in.**

9 The aquarium



a. $V = 24 \times 10 \times 12 = 240 \times 12 = 2,880$. The volume is **$2,880 \text{ in}^3$** .

b. Half the height is 6 in, so $V = 24 \times 10 \times 6 = 1,440$. The water has a volume of **$1,440 \text{ in}^3$** , which is half of 2,880.

10 Using the base area



a. $B = 6 \times 3 = 18 \text{ ft}^2$.

b. $V = 18 \times 5 = 90$. The volume is **90 ft^3** .

11 Packing cubes



Along the length: $12 \div 3 = 4$ cubes. Along the width: $9 \div 3 = 3$ cubes. Along the height: $6 \div 3 = 2$ layers.

One layer has $4 \times 3 = 12$ cubes, so the box holds $12 \times 2 = 24$ cubes.

Check with volumes: the box is $12 \times 9 \times 6 = 648 \text{ in}^3$, each cube is $3 \times 3 \times 3 = 27 \text{ in}^3$, and $648 \div 27 = 24$. **24 cubes** fit.

12 Two prisms joined



Shed: $10 \times 8 \times 7 = 560 \text{ ft}^3$.

Bin: $4 \times 8 \times 5 = 160 \text{ ft}^3$.

The two solids do not overlap, so we add: $560 + 160 = 720$.

The total volume is 720 ft^3 .

13 Capacity and weight



a. $3 \times 4 = 12$, so 3 gal = 12 qt.

b. 2 cups make 1 pint: $40 \div 2 = 20$, so 40 c = 20 pt.

c. $6 \times 16 = 96$, so 6 lb = 96 oz.

d. $3 \times 2,000 = 6,000$, so 3 tons = 6,000 lb.

14 Metric mass and capacity



a. $2.5 \times 1,000 = 2,500$, so 2.5 kg = 2,500 g.

b. $8,000 \div 1,000 = 8$, so 8,000 mL = 8 L.

c. $350 \div 100 = 3.5$, so 350 cm = 3.5 m.

d. $0.75 \times 1,000 = 750$, so 0.75 L = 750 mL.

15 Which is bigger?



a. 2 ft 6 in = $2 \times 12 + 6 = 30$ in. Since $31 > 30$, 31 in is greater.

b. 1.2 km = 1,200 m. Since $1,200 > 1,150$, 1.2 km is greater.

c. 3 lb = $3 \times 16 = 48$ oz. Since $50 > 48$, 50 oz is greater.

16 True or false?



- a. **True.** For example $3 \times 4 \times 5 = 60$ and $6 \times 4 \times 5 = 120$, which is twice as much.
- b. **False.** $4 \times 4 \times 4 = 64$, so the volume is 64 cm^3 . (16 is the area of one face.)
- c. **False.** $1 \text{ yd} = 3 \text{ ft} = 3 \times 12 = 36 \text{ in.}$
- d. **True.** $5,000 \div 1,000 = 5$.

17 An L-shaped solid



Adding. Tall part: $3 \times 4 \times 6 = 72 \text{ cm}^3$. Low part: $5 \times 4 \times 2 = 40 \text{ cm}^3$. Total:
 $72 + 40 = 112 \text{ cm}^3$.

Subtracting. The full block is $8 \times 4 \times 6 = 192 \text{ cm}^3$. The missing corner is 5 cm long, 4 cm wide and $6 - 2 = 4$ cm high: $5 \times 4 \times 4 = 80 \text{ cm}^3$. Then $192 - 80 = 112$.

Both methods give a volume of 112 cm^3 .

18 Filling a tank



- a. $V = 20 \times 10 \times 15 = 3,000 \text{ cm}^3$.
- b. $3,000 \text{ cm}^3 = 3,000 \text{ mL} = 3,000 \div 1,000 = 3 \text{ L}$. The tank holds **3 L**.
- c. $3 - 2.4 = 0.6 \text{ L}$, and $0.6 \times 1,000 = 600$. **600 mL** are still needed.

19 Two missing measures



- a. $210 = 35 \times h$, so $h = 210 \div 35 = 6$. The height is **6 cm**.
- b. $B = l \times w$, so $35 = l \times 7$ and $l = 35 \div 7 = 5$. The length is **5 cm**.

Check: $5 \times 7 \times 6 = 210$.

20 Doubling dimensions



- a. $3 \times 4 \times 5 = 60 \text{ in}^3$.
- b. New height 10 in: $3 \times 4 \times 10 = 120 \text{ in}^3$. That is $120 \div 60 = 2$ times as large.
- c. New size 6 by 8 by 10: $6 \times 8 \times 10 = 480 \text{ in}^3$. That is $480 \div 60 = 8$ times as large, because each of the three dimensions doubled: $2 \times 2 \times 2 = 8$.

21 Punch for the party



- a. 1 gal = 4 qt = 8 pt = 16 c, so 3 gal = $3 \times 16 = 48$ cups.
- b. $48 \div \frac{3}{4} = 48 \times \frac{4}{3} = 64$. The cooler fills **64 servings**.

22 Sharing sand equally



- a. The bags hold $\frac{1}{8}$, $\frac{3}{8}$, $\frac{3}{8}$, $\frac{4}{8}$ and $\frac{4}{8}$ lb. The total is $\frac{1+3+3+4+4}{8} = \frac{15}{8}$ lb, or $1\frac{7}{8}$ lb.
- b. $\frac{15}{8} \div 5 = \frac{15}{40} = \frac{3}{8}$. Each bag gets $\frac{3}{8}$ lb.



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