

Grade 6 · Volume of Rectangular Prisms · Worksheet Answer Key

Common Core 6.G.A.2 · mathovore.fr

Every solution shows the formula, the substitution, and the final volume in cubic units. Use the answers to check your work, and compare the cube-counting method with the multiplication method in the packing problems, since both must give the same volume.

Grade 6 Common Core: 6.G.A.2

Problem 1: Whole-number edges

$$V = \ell wh = 6 \times 4 \times 3 = 24 \times 3 = 72$$

The volume is 72 ft^3 .

Problem 2: Prism with labeled edges

$$V = \ell wh = 7 \times 5 \times 4$$

$$7 \times 5 = 35 \text{ and } 35 \times 4 = 140.$$

The volume is 140 in^3 .

Problem 3: Box volume

$$V = 7 \times 5 \times 2 = 35 \times 2 = 70$$

The volume is 70 in^3 .

Problem 4: Volume of a cube

A cube has equal edges, so $V = s^3 = 6 \times 6 \times 6$.

$$6 \times 6 = 36 \text{ and } 36 \times 6 = 216.$$

The volume is 216 in^3 .

Problem 5: Base area times height

$$V = Bh = 24 \times 5 = 120$$

The volume is 120 in^3 .

Problem 6: Height from base area

$$V = Bh, \text{ so } 252 = 36h.$$

$$h = 252 \div 36 = 7$$

$$\text{Check: } 36 \times 7 = 252.$$

The height is 7 ft.

Problem 7: Fractional width

$$V = 4 \times \frac{1}{2} \times 3 = 2 \times 3 = 6$$

The volume is 6 in³.

Problem 8: Two fraction edges

$$V = \frac{2}{3} \times \frac{3}{4} \times 6$$

$$\frac{2}{3} \times \frac{3}{4} = \frac{6}{12} = \frac{1}{2} \text{ and } \frac{1}{2} \times 6 = 3.$$

The volume is 3 ft³.

Problem 9: Mixed-number edges

$$V = \frac{5}{2} \times \frac{3}{2} \times 2 = \frac{15}{4} \times 2 = \frac{30}{4} = \frac{15}{2} = 7\frac{1}{2}$$

The volume is 7 $\frac{1}{2}$ ft³.

Problem 10: Missing height

$$150 = 10 \times 5 \times h = 50h$$

$$h = 150 \div 50 = 3$$

The height is 3 ft.

Problem 11: Missing length

$$30 = \ell \times 2\frac{1}{2} \times 4. \text{ Since } 2\frac{1}{2} \times 4 = 10, \text{ we have } 30 = 10\ell.$$

$$\ell = 30 \div 10 = 3$$

$$\text{Check: } 3 \times 2.5 \times 4 = 30.$$

The length is 3 ft.

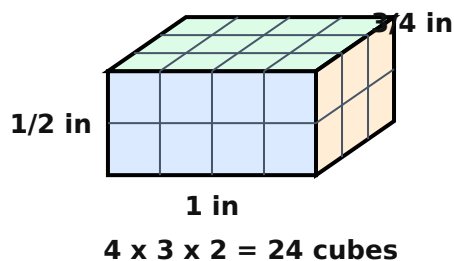
Problem 12: Packing with cubes

(a) Along each edge: $1 \div \frac{1}{4} = 4$, $\frac{3}{4} \div \frac{1}{4} = 3$, $\frac{1}{2} \div \frac{1}{4} = 2$. Cubes: $4 \times 3 \times 2 = 24$.

(b) Four cubes fill 1 inch in each direction, so 64 fit in a 1-inch cube: $\frac{1}{64} \text{ in}^3$.

(c) $24 \times \frac{1}{64} = \frac{3}{8}$. Check: $1 \times \frac{3}{4} \times \frac{1}{2} = \frac{3}{8}$.

Answers: **24 cubes**, $\frac{1}{64} \text{ in}^3$, $\frac{3}{8} \text{ in}^3$.



Solution figure.

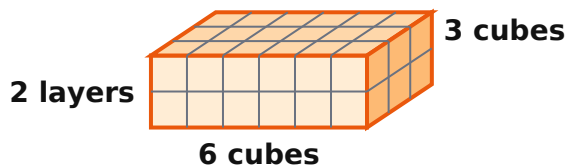
Problem 13: Packing with thirds

(a) Along each edge: $2 \div \frac{1}{3} = 6$, $1 \div \frac{1}{3} = 3$, $\frac{2}{3} \div \frac{1}{3} = 2$. Cubes: $6 \times 3 \times 2 = 36$.

(b) One cube: $\frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} = \frac{1}{27} \text{ ft}^3$.

(c) $36 \times \frac{1}{27} = \frac{36}{27} = \frac{4}{3}$. Check: $2 \times 1 \times \frac{2}{3} = \frac{4}{3}$.

(a) 36 cubes. (b) $\frac{1}{27} \text{ ft}^3$. (c) $1\frac{1}{3} \text{ ft}^3$.



Counting: $6 \times 3 \times 2 = 36$ cubes.

Problem 14: Cube versus box

Box: $12 \times 8 \times 5 = 96 \times 5 = 480 \text{ in}^3$.

Cube: $8 \times 8 \times 8 = 64 \times 8 = 512 \text{ in}^3$.

$512 - 480 = 32$

The cube holds more, by 32 in^3 .

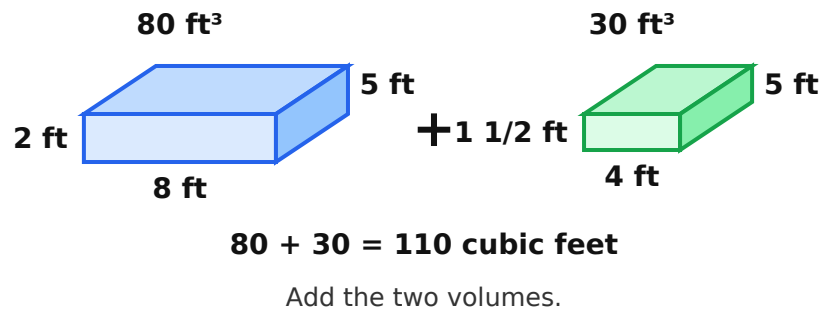
Problem 15: Two-step stage

Bottom prism: $8 \times 5 \times 2 = 80 \text{ ft}^3$.

Top prism: $4 \times 5 \times 1\frac{1}{2} = 20 \times \frac{3}{2} = 30 \text{ ft}^3$.

Total: $80 + 30 = 110$.

The stage has a volume of 110 ft^3 .



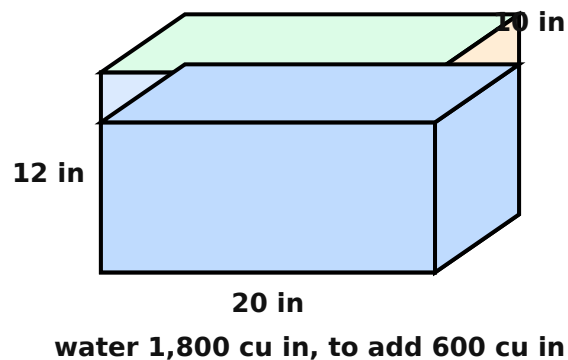
Problem 16: Aquarium

Water: $20 \times 10 \times 9 = 1,800 \text{ in}^3$.

Full tank: $20 \times 10 \times 12 = 2,400 \text{ in}^3$.

To add: $2,400 - 1,800 = 600$.

The tank holds $1,800 \text{ in}^3$ of water and needs 600 in^3 more.



Solution figure.

Problem 17: Patio slab

$$\text{Volume: } 12 \times 9 \times \frac{1}{2} = 108 \times \frac{1}{2} = 54 \text{ ft}^3.$$

$$\text{Cost: } 54 \times 8.50 = 459.$$

The slab has a volume of 54 ft^3 and the concrete costs \$459.00.

Problem 18: Moving truck

$$\text{Cargo area: } 12 \times 6 \times 6 = 432 \text{ ft}^3.$$

$$\text{One box: } 2 \times \frac{3}{2} \times \frac{3}{2} = \frac{9}{2} = 4.5 \text{ ft}^3.$$

$$432 \div 4.5 = 96$$

Check by rows: $12 \div 2 = 6$ boxes along the length, $6 \div 1.5 = 4$ across, and 4 layers. $6 \times 4 \times 4 = 96$.

96 boxes.

Problem 19: Storage boxes

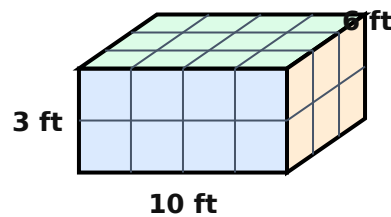
$$\text{Box: } \frac{5}{2} \times 2 \times \frac{3}{2} = \frac{15}{2} = 7.5 \text{ ft}^3.$$

$$\text{Space: } 10 \times 6 \times 3 = 180 \text{ ft}^3.$$

$$180 \div 7.5 = 24$$

Check by rows: $10 \div 2.5 = 4$, $6 \div 2 = 3$, $3 \div 1.5 = 2$, and $4 \times 3 \times 2 = 24$.

24 boxes fit.



$$4 \times 3 \times 2 = 24 \text{ boxes}$$

Solution figure.

Problem 20: Sandbox

$$V = 6 \times \frac{9}{2} \times \frac{3}{4} = 27 \times \frac{3}{4} = \frac{81}{4} = 20.25 \text{ ft}^3.$$

$$\text{Cost: } 20.25 \times \$4 = \$81.$$

The sand fills 20.25 ft^3 and costs \$81.