

Grade 7 · Area, Surface Area and Volume of Prisms · Worksheet Answer Key

Common Core 7.G.B.6 · mathovore.fr

This answer key gives a worked solution to each of the 20 area, volume, and surface area problems. Each solution shows how the figure is split, every formula, and the arithmetic, and ends with the answer in bold with correct units. Use it to check your work and fix mistakes.

Grade 7 Common Core: 7.G.B.6

Problem 1: Parallelogram and triangle

a. $A = bh = 9 \times 6 = 54$.

b. $A = \frac{1}{2}bh = \frac{1}{2} \times 14 \times 5 = \frac{1}{2} \times 70 = 35$.

(a) 54 in². (b) 35 in².

Problem 2: Volume of a rectangular prism

$$V = \ell wh = 8 \times 5 \times 3.$$

$$8 \times 5 = 40 \text{ and } 40 \times 3 = 120.$$

$$120 \text{ in}^3$$

Problem 3: Cube surface and volume

A cube has 6 identical square faces. One face: $7 \times 7 = 49$. Surface area: $6 \times 49 = 294$.

Volume: $7 \times 7 \times 7 = 49 \times 7 = 343$.

Surface area 294 ft²; volume 343 ft³.

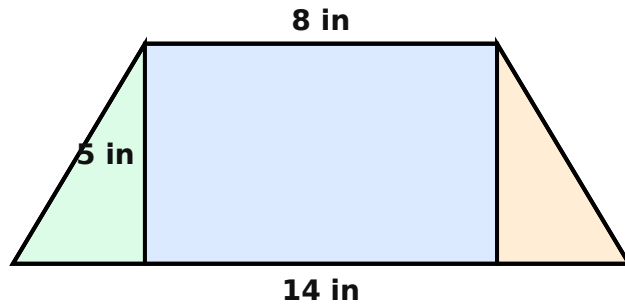
Problem 4: Area of a trapezoid

Use $A = \frac{1}{2}(b_1 + b_2)h$ with $b_1 = 8$, $b_2 = 14$, $h = 5$.

$$A = \frac{1}{2}(8 + 14)(5) = \frac{1}{2}(22)(5) = 55.$$

Check by splitting: two triangles with base 3 and height 5 have area 7.5 each, and the middle rectangle is $8 \times 5 = 40$. $7.5 + 7.5 + 40 = 55$.

$$55 \text{ in}^2$$



Solved: two triangles and a rectangle.

Problem 5: Trapezoid ramp

$$A = \frac{1}{2}(b_1 + b_2)h = \frac{1}{2}(9 + 15)(6)$$

$$= \frac{1}{2}(24)(6) = 12 \times 6 = 72.$$

Check: the average of the bases is 12, and $12 \times 6 = 72$.

$$72 \text{ ft}^2$$

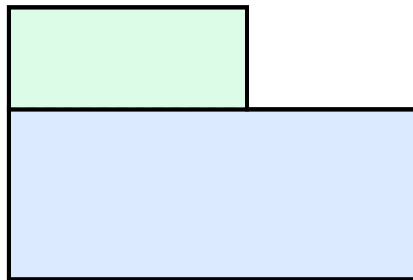
Problem 6: Area of an L-shape

Split the patio into a bottom rectangle 12 ft by 5 ft and a top rectangle 7 ft by 3 ft.

$$12 \times 5 = 60 \text{ and } 7 \times 3 = 21, \text{ so } 60 + 21 = 81.$$

Check: the full $12 \times 8 = 96$ minus the notch $5 \times 3 = 15$ is 81.

$$81 \text{ ft}^2$$



Solved: two rectangles, $60 + 21$.

Problem 7: Lawn with a pool

Whole yard: $20 \times 12 = 240$.

Pool: $5 \times 4 = 20$.

Grass: $240 - 20 = 220$.

220 ft^2

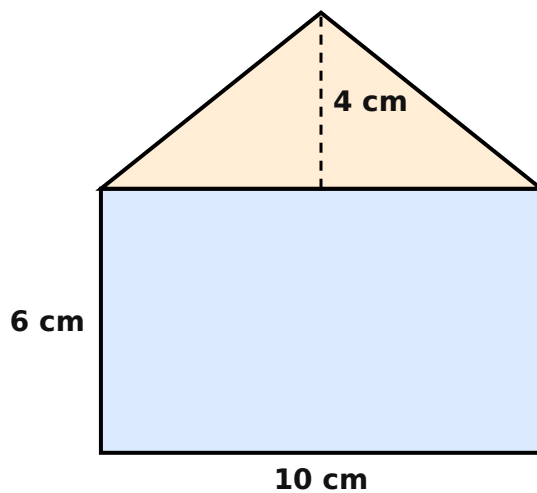
Problem 8: Rectangle and triangle

Rectangle: $10 \times 6 = 60$.

Triangle: $\frac{1}{2} \times 10 \times 4 = 20$.

Total: $60 + 20 = 80$.

80 cm^2



Solved: $60 + 20 = 80$ square centimeters.

Problem 9: Volume of a triangular prism

Base area: $B = \frac{1}{2} \times 6 \times 5 = 15$.

$V = Bh = 15 \times 12 = 180$.

180 cm^3

Problem 10: Right triangle prism

Base area: $B = \frac{1}{2} \times 7 \times 6 = 21$.

$V = Bh = 21 \times 8 = 168$.

168 in^3

Problem 11: Surface area of a box

The faces come in three pairs.

Top and bottom: $2 \times (12 \times 7) = 2 \times 84 = 168$.

Front and back: $2 \times (12 \times 5) = 2 \times 60 = 120$.

Two sides: $2 \times (7 \times 5) = 2 \times 35 = 70$.

$168 + 120 + 70 = 358$.

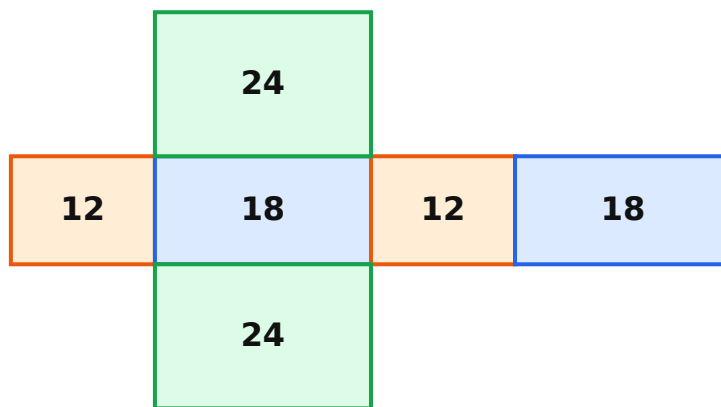
358 in^2

Problem 12: Surface area from a net

Find the area of each face. Top and bottom: $6 \times 4 = 24$ each. Front and back: $6 \times 3 = 18$ each. Two sides: $4 \times 3 = 12$ each.

Add the six faces: $24 + 24 + 18 + 18 + 12 + 12 = 108$.

Check with pairs: $2(24 + 18 + 12) = 2(54) = 108$.



Area of each face in square inches.

108 in^2

Problem 13: Surface area of a triangular prism

Each base: $B = \frac{1}{2} \times 12 \times 5 = 30$, so the two bases total 60.

Rectangles: $12 \times 8 = 96$, $5 \times 8 = 40$, $13 \times 8 = 104$. Their sum is 240.

Surface area: $60 + 240 = 300$.

300 cm²

Problem 14: Missing prism length

Base area: $B = \frac{1}{2} \times 10 \times 6 = 30$.

$V = Bh$, so $270 = 30h$ and $h = 270 \div 30 = 9$.

Check: $30 \times 9 = 270$.

9 cm

Problem 15: Missing dimension

$V = Bh$ and the base area is $B = 24 \times 10 = 240$.

$240h = 3,600$, so $h = 3,600 \div 240 = 15$.

Check: $24 \times 10 \times 15 = 3,600$.

15 in

Problem 16: Painting a toy chest

Lid: $4 \times 2 = 8$. Front and back: $2 \times (4 \times 2) = 16$. Two ends: $2 \times (2 \times 2) = 8$.

Area to paint: $8 + 16 + 8 = 32$ ft² (the bottom is left out).

Cans: $32 \div 16 = 2$. Cost: $2 \times 9 = 18$.

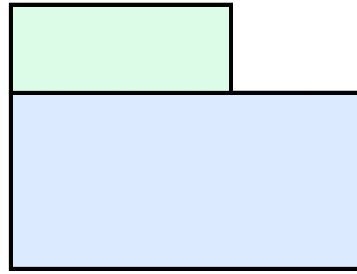
32 ft² to paint; the paint costs \$18.

Problem 17: Volume of a composite solid

First find the area of the L-shaped face: $8 \times 6 - 3 \times 2 = 48 - 6 = 42$.

Then $V = Bh = 42 \times 5 = 210$.

210 cm³



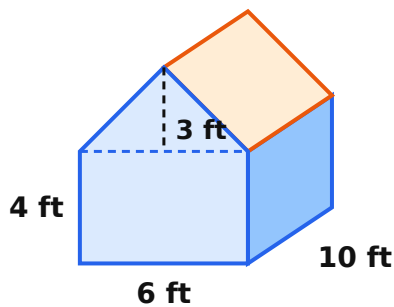
Solved: the face has area $32 + 10 = 42$.

Problem 18: House-shaped solid

Rectangular part: $V = 6 \times 4 \times 10 = 240 \text{ ft}^3$.

Roof: the triangle has area $\frac{1}{2} \times 6 \times 3 = 9$, so $V = 9 \times 10 = 90 \text{ ft}^3$.

Total: $240 + 90 = 330$.



Wall block: $6 \times 4 \times 10 = 240$

Roof prism: $(\frac{1}{2} \times 6 \times 3) \times 10 = 90$

Total: $240 + 90 = 330$

Split the solid into two prisms and add.

330 ft^3

Problem 19: Tiling a pool

(a) $V = 20 \times 10 \times 5 = 1,000 \text{ ft}^3$.

(b) Floor: $20 \times 10 = 200$. Two long walls: $2 \times (20 \times 5) = 200$. Two short walls: $2 \times (10 \times 5) = 100$. The pool has no top, so the area is $200 + 200 + 100 = 500 \text{ ft}^2$.

(c) $500 \times 3 = 1,500$.

(a) $1,000 \text{ ft}^3$. (b) 500 ft^2 . (c) $\$1,500$.

Problem 20: Tent problem

- a. Base area: $\frac{1}{2} \times 6 \times 4 = 12$. Volume: $12 \times 8 = 96$. 96 ft^3
- b. Two ends: $2 \times 12 = 24$. Two slanted sides: $2 \times (5 \times 8) = 80$. Total: $24 + 80 = 104$. 104 ft^2

The floor, $6 \times 8 = 48 \text{ ft}^2$, is not counted.