

Prisms: Surface Area, Volume and Composite Figures

Grade 7 math · Worksheet Answer Key · Standards: 7.G.B.6

Each solution lists the formula, the substitution and the unit. Look for the decomposition step in the composite problems: a different split of the shape should give the same total, which is a good way to check.

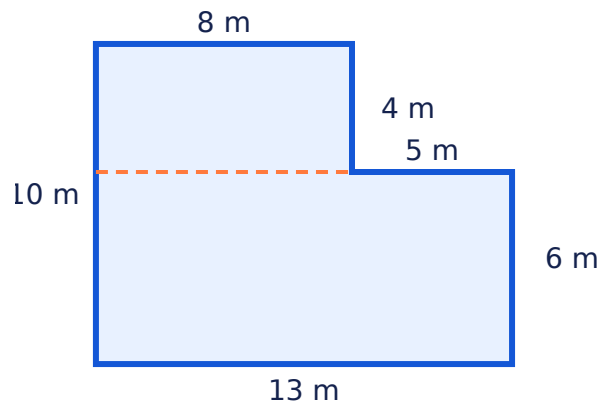
Standards: 7.G.B.6 · **Level:** Grade 7

Problem 1 Area with a notch

Whole rectangle: $13 \times 10 = 130 \text{ m}^2$. Notch: $5 \times 4 = 20 \text{ m}^2$.

$$130 - 20 = 110.$$

110 m²



$$\text{Check: } 8 \times 4 + 13 \times 6 = 32 + 78 = 110.$$

Problem 2 House outline

Rectangle: $12 \times 7 = 84 \text{ m}^2$. Triangle: $\frac{1}{2} \times 12 \times 5 = 30 \text{ m}^2$.

$$84 + 30 = 114.$$

114 m²

triangle: $\frac{1}{2} \times 12 \times 5 = 30 \text{ m}^2$

rectangle: $12 \times 7 = 84 \text{ m}^2$

total: $30 + 84 = 114 \text{ m}^2$

The two pieces add to 114 m^2 .

Problem 3 Volume of a box

$V = lwh = 11 \times 3 \times 8 = 264.$

264 in^3

Problem 4 Surface area of a box

$SA = 2(lw + lh + wh) = 2(21 + 35 + 15) = 2(71) = 142.$

142 ft^2

Problem 5 Triangular prism volume

$B = \frac{1}{2} \times 9 \times 4 = 18 \text{ cm}^2. V = Bh = 18 \times 15 = 270.$

270 cm^3

Problem 6 Cube measurements

$V = 7^3 = 343.$ Each face is $7 \times 7 = 49$, and there are 6 faces: $SA = 6 \times 49 = 294.$

$V = 343 \text{ cm}^3; SA = 294 \text{ cm}^2$

Problem 7 Trapezoid area

$A = \frac{1}{2}(11 + 17) \times 6 = \frac{1}{2} \times 28 \times 6 = 84.$

84 m^2

Problem 8 Volume from base area

$V = Bh = 36.5 \times 12 = 438.$

438 cm^3

Problem 9 Missing height

Base area: $12 \times 5 = 60 \text{ in}^2$. $h = V \div B = 360 \div 60 = 6$.

6 in

Problem 10 Triangular prism surface area

Base area: $B = \frac{1}{2} \times 8 \times 15 = 60 \text{ in}^2$. Perimeter: $8 + 15 + 17 = 40 \text{ in}$.

$SA = 2B + Ph = 2(60) + 40 \times 9 = 120 + 360 = 480$.

480 in²

Problem 11 T-shaped figure

Top: $18 \times 5 = 90 \text{ m}^2$. Stem: $6 \times 9 = 54 \text{ m}^2$.

$90 + 54 = 144$.

144 m²

Problem 12 Stacked blocks

Bottom: $12 \times 8 \times 3 = 288 \text{ cm}^3$. Top: $6 \times 8 \times 4 = 192 \text{ cm}^3$.

$288 + 192 = 480$.

480 cm³

Problem 13 Missing base of a triangle

$A = \frac{1}{2}bh$, so $84 = \frac{1}{2} \times b \times 12 = 6b$. Then $b = 84 \div 6 = 14$.

14 cm

Problem 14 Air in a tent

$B = \frac{1}{2} \times 6 \times 4 = 12 \text{ ft}^2$. $V = 12 \times 8 = 96$.

96 ft³

Problem 15 Swimming pool

Treat the trapezoid as the base: $B = \frac{1}{2}(3 + 8) \times 20 = 110 \text{ ft}^2$. $V = 110 \times 10 = 1,100 \text{ ft}^3$.

Gallons: $1,100 \times 7.5 = 8,250$.

1,100 ft³, about 8,250 gallons

Problem 16 Painting a crate

$SA = 2(5 \times 3 + 5 \times 2.5 + 3 \times 2.5) = 2(15 + 12.5 + 7.5) = 2(35) = 70 \text{ ft}^2$.

$70 \div 40 = 1.75$, so 2 whole quarts are needed.

70 ft²; 2 quarts

Problem 17 Carpet cost

Area: $20 \times 12 + 8 \times 6 = 240 + 48 = 288 \text{ ft}^2$.

Cost: $288 \times 2.75 = 792$.

\$792.00

Problem 18 Chocolate box

$B = \frac{1}{2} \times 10 \times 12 = 60 \text{ cm}^2$. $V = 60 \times 20 = 1,200$.

Perimeter: $10 + 13 + 13 = 36 \text{ cm}$. $SA = 2(60) + 36 \times 20 = 120 + 720 = 840$.

V = 1,200 cm³; SA = 840 cm²

Problem 19 Concrete steps

The side view is made of columns 3 ft wide with heights 2, 3 and 5 ft: $\text{area} = 3(2) + 3(3) + 3(5) = 30 \text{ ft}^2$.

$V = 30 \times 4 = 120$.

120 ft³

Problem 20 Slab with a block

Slab: $2(100) + 4(10 \times 4) = 200 + 160 = 360 \text{ cm}^2$. Cube: $6 \times 36 = 216 \text{ cm}^2$.

The glued region is $6 \times 6 = 36 \text{ cm}^2$, hidden on both solids: $360 + 216 - 2(36) = 504$.

504 cm²