

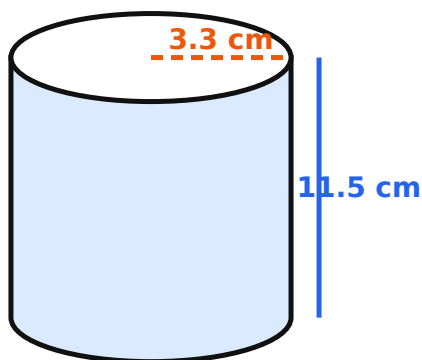
Geometry - Geometric Modeling Applications - Answer Key

Common Core G-MG.A.1, G-MG.A.2, G-MG.A.3 · maths-pdf.fr/en/

Use this answer key to check the 20 problems on geometric modeling. Every solution shows the formula or theorem used, each step of the work, and the final answer in bold. If an answer differs from yours, compare the steps line by line to find where the work changed.

Geometry · Common Core State Standards: **G-MG.A.1, G-MG.A.2, G-MG.A.3**

Exercise 1 - Can as a cylinder



V is about 393.4 cm^3 .

Radius 3.3 cm.

$$V = \pi \cdot 3.3^2 \cdot 11.5 = 393.4$$

393.4 cubic centimeters

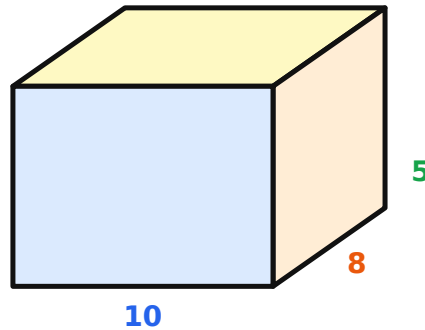
Exercise 2 - A log

Radius 12 in = 1 ft. Length 20 ft.

$$V = \pi \cdot 1^2 \cdot 20 = 20\pi = 62.8$$

62.8 cubic feet

Exercise 3 - Density of aluminum



$$V = 400 \text{ cm}^3.$$

$$\text{Volume: } 10 \cdot 8 \cdot 5 = 400 \text{ cm}^3.$$

$$\frac{1,080}{400} = 2.7$$

2.7 g per cm³

Exercise 4 - Mass of a lead cylinder

$$V = \pi \cdot 2^2 \cdot 10 = 40\pi = 125.7 \text{ cm}^3.$$

$$11.34 \cdot 125.66 = 1,425$$

About 1,425 grams

Exercise 5 - Population density

$$\frac{31,250}{12.5} = 2,500$$

2,500 people per square mile

Exercise 6 - Population from density

$$4,200 \cdot 6.5 = 27,300$$

27,300 people

Exercise 7 - Painting a room

Walls: $2(12+10) \cdot 8 = 352$ sq ft.

$\frac{352}{350} = 1.01$, so 2 gallons are needed.

Cost: $2 \cdot \$32 = \$64$.

352 sq ft; 2 gallons; \$64

Exercise 8 - Weight of a beam

Cross section: $\frac{4}{12} \cdot \frac{6}{12} = \frac{1}{6}$ sq ft.

Volume: $\frac{1}{6} \cdot 12 = 2$ cu ft.

Weight: $2 \cdot 35 = 70$ pounds.

2 cu ft; 70 pounds

Exercise 9 - Gallons in a tank

$V = \pi \cdot 16 \cdot 10 = 160\pi = 502.7$ cu ft.

$502.7 \cdot 7.48 = 3,760$

About 3,760 gallons

Exercise 10 - Concrete slab

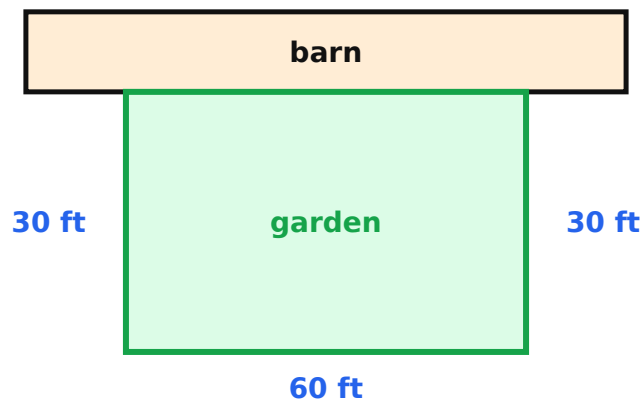
Thickness $\frac{4}{12} = \frac{1}{3}$ ft.

Volume: $20 \cdot 12 \cdot \frac{1}{3} = 80$ cu ft $= \frac{80}{27} = 2.96$ cu yd.

Cost: $2.96 \cdot \$145 = \$430$

2.96 cu yd; about \$430

Exercise 11 - Fence design



Best of the three designs: 30 ft by 60 ft.

Constraint: $2w + l = 120$, so $l = 120 - 2w$.

$w = 25$: $l = 70$, area 1,750. $w = 30$: $l = 60$, area 1,800. $w = 35$: $l = 50$, area 1,750.

Width 30 ft by length 60 ft, area 1,800 sq ft

Exercise 12 - Minimum height of a tank

$$\pi \cdot 5^2 \cdot h \geq 1,000$$

$$h \geq \frac{1,000}{25\pi} = 12.7$$

At least 12.7 feet

Exercise 13 - Material for a can

$$2\pi r^2 + 2\pi r h = 2\pi(3.3)^2 + 2\pi(3.3)(11.5)$$

$$= 68.4 + 238.4 = 307$$

About 307 square centimeters

Exercise 14 - Painting a tank

$$2\pi \cdot 4 \cdot 10 = 80\pi = 251.3 \text{ sq ft.}$$

$$\frac{251.3}{250} = 1.005, \text{ so buy 2 gallons.}$$

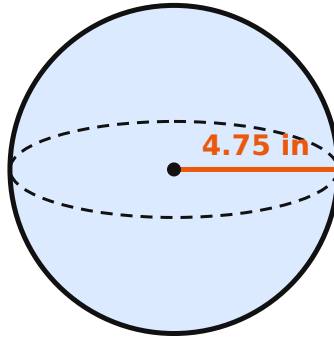
251.3 sq ft; 2 gallons

Exercise 15 - Attic volume

$$V = \frac{1}{3} \cdot (30 \cdot 20) \cdot 8 = 1,600$$

1,600 cubic feet

Exercise 16 - Basketball



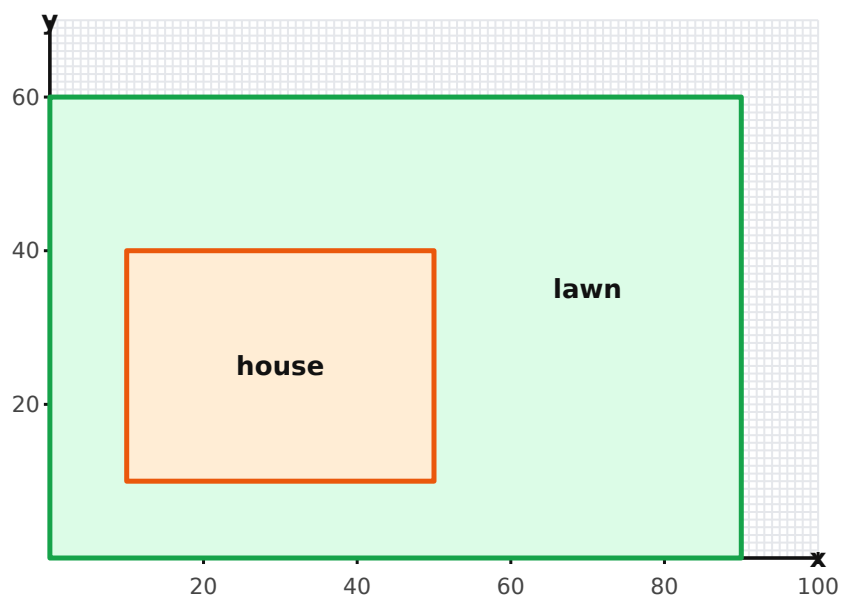
V is about 448.9 in³.

Radius 4.75 in.

$$V = \frac{4}{3} \pi \cdot 4.75^3 = 448.9$$

448.9 cubic inches

Exercise 17 - Grass seed



Lot with the house footprint.

Lot: $60 \cdot 90 = 5,400$. House: $40 \cdot 30 = 1,200$.

Seeded area: $5,400 - 1,200 = 4,200$ sq ft.

$$\frac{4,200}{400} = 10.5$$

10.5 pounds

Exercise 18 - Honeycomb cell

$$A = \frac{3\sqrt{3}}{2} \cdot 3^2 = \frac{27\sqrt{3}}{2} = 23.4$$

23.4 square millimeters

Exercise 19 - Tennis ball can

Can: $\pi r^2 \cdot 6r = 6\pi r^3$.

Balls: $3 \cdot \frac{4}{3}\pi r^3 = 4\pi r^3$.

Empty: $6\pi r^3 - 4\pi r^3 = 2\pi r^3$, which is $\frac{2}{6} = \frac{1}{3}$ of the can.

One third

Exercise 20 - Best pizza value

10-inch: $\pi \cdot 5^2 = 78.5$ sq in, so $\frac{78.5}{8} = 9.8$ sq in per dollar.

14-inch: $\pi \cdot 7^2 = 153.9$ sq in, so $\frac{153.9}{14} = 11.0$ sq in per dollar.

The 14-inch pizza is the better value