

Cross Sections, Rotations and Geometric Modeling

Grade 10 – Geometry math · Test Answer Key · Standards: G-GMD.B.4, G-MG.A.1, G-MG.A.2, G-MG.A.3

Each solution shows the model, the formula and the final value with units. The scoring notes show how partial credit is earned for setting up the model and for the conclusion in context.

Standards: G-GMD.B.4, G-MG.A.1, G-MG.A.2, G-MG.A.3 · **Level:** Grade 10 Geometry

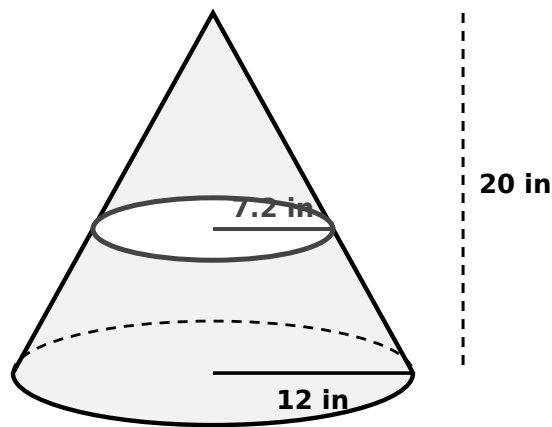
Question 1 Name the Cross Sections (2 points)

(a) a circle, smaller than the base. (b) a rectangle.

(a) circle (b) rectangle

Scoring: 1 point each.

Question 2 Slice of a Cone (2 points)



Cross section radius 7.2 in.

The scale factor is $\frac{12}{20} = \frac{3}{5}$. Radius = $12 \cdot \frac{3}{5} = 7.2$ in.

Area = $\pi(7.2^2) = 51.84\pi \approx 162.9$ in².

7.2 in; $51.84\pi \approx 162.9$ in²

Scoring: 1 point each.

Question 3 Rotated Triangle (2 points)

Cone with radius 7 and height 9. $V = \frac{1}{3}\pi(7^2)(9) = 147\pi \approx 461.81$.

Cone; ≈ 461.8 cubic units

Scoring: 1 point for the solid, 1 point for the volume.

Question 4 Compare Densities (3 points)

A: $28,350 \div 63 = 450$. B: $120,900 \div 190 \approx 636.32$.

636.3 is greater than 450.

A: 450 per mi²; B: ≈ 636.3 per mi²; County B is denser

Scoring: 1 point for each density, 1 point for the comparison.

Question 5 Furnace Choice (3 points)

Volume = $20 \cdot 15 \cdot 9 = 2,700 \text{ ft}^3$. BTUs needed = $2,700 \cdot 24 = 64,800$.

Furnace A (60,000) is too small. Furnace B (75,000) is enough.

64,800 BTUs; only furnace B

Scoring: 1 point for the volume, 1 point for the BTUs, 1 point for the decision.

Question 6 Design a Container (3 points)

$\pi(5^2)h = 1,000$, so $h = \frac{1000}{25\pi} = \frac{40}{\pi} \approx 12.73$.

12.7 is greater than 12, so it does not fit.

$h \approx 12.7$ cm; does not fit

Scoring: 1 point for the equation, 1 point for the height, 1 point for the decision.

Question 7 Grain Bin (3 points)

Volume = $\pi(8^2)(20) = 1,280\pi \approx 4021.24 \text{ ft}^3$.

Bushels = $4021.24 \div 1.244 \approx 3232.51$.

≈ 3233 bushels

Scoring: 1 point for the volume, 1 point for the conversion, 1 point for the answer.

Question 8 Rotate the Shape (2 points)

(a) a cylinder. (b) a sphere.

(a) cylinder (b) sphere

Scoring: 1 point each.