Name _____

Composite Volumes at School Answer Key

1) Backpack + Side Pocket (rectangular prism + cylinder)

- Prism: $V = 30 \cdot 20 \cdot 45 = 27{,}000\ \text{cm}^3$
- Cylinder: $V = \pi r^2 h = 3.14 \cdot 5^2 \cdot 18 = 1{,}413.00\ \text{cm}^3$
- **Total:** $27{,}000 + 1{,}413 = 28{,}413\ \text{cm}^3 = \boxed{28.41\ \text{L}}$

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2) Water Bottle Capacity (cylinder + hemisphere)

- Cylinder: $V = 3.14 \cdot 3.5^2 \cdot 22 = 846.23\ \text{cm}^3$
- Hemisphere: $V = \frac{2}{3}\pi r^3 = \frac{2}{3} \cdot 3.14 \cdot 3.5^3 = 89.75\ \text{cm}^3$
- **Total:** $846.23 + 89.75 = \boxed{935.98\ \text{cm}^3}$

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3) Mechanical Pencil (cylinder + cone)

- Cylinder: $V = 3.14 \cdot 0.4^2 \cdot 17 = 8.5408\ \text{cm}^3$
- Cone: $V = \frac{1}{3} \cdot 3.14 \cdot 0.3^2 \cdot 1.2 = 0.11304\ \text{cm}^3$
- **Total:** $8.5408 + 0.11304 = \boxed{8.65\ \text{cm}^3}$

4) Bike Helmet Shell (outer hemisphere − inner hemisphere)

- Outer (r = 14): $V_o = \frac{2}{3} \cdot 3.14 \cdot 14^3 = 5{,}744.11\ \text{cm}^3$
- Inner (r = 13): $V_i = \frac{2}{3} \cdot 3.14 \cdot 13^3 = 4{,}599.05\ \text{cm}^3$
- **Shell:** $5{,}744.11 - 4{,}599.05 = \boxed{1{,}145.05\ \text{cm}^3}$

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5) Entrance Planter (prism − rectangular void − 2 cylinders)

- Box: $V = 120 \cdot 40 \cdot 35 = 168{,}000\ \text{cm}^3$
- Rectangular void: $V = 60 \cdot 10 \cdot 10 = 6{,}000\ \text{cm}^3$
- One pipe: $V = 3.14 \cdot 3^2 \cdot 35 = 989.10\ \text{cm}^3 \Rightarrow$ Two pipes: $1{,}978.20\ \text{cm}^3$
- **Soil capacity:** $168{,}000 - 6{,}000 - 1{,}978.20 = \boxed{160{,}021.80\ \text{cm}^3}$ ($\approx 160.02\ \text{L}$)