Name _____

Friday Night Volumes - Math Under the Stadium Lights Answer Key

1) Gatorade Cooler (cylinder + hemisphere)

- Cylinder: $V_c = \pi r^2 h = 3.14(15^2)(40) = 3.14(225)(40) = 28{,}260 \text{ cm}^3$
- Hemisphere: $V_h = \frac{2}{3}\pi r^3 = \frac{2}{3} \cdot 3.14 \cdot 15^3 = \frac{2}{3} \cdot 3.14 \cdot 3375 = 7{,}065 \text{ cm}^3$
- **Total:** $28{,}260 + 7{,}065 = \boxed{35{,}325 \text{ cm}^3}$

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2) Stadium Light Cover (cone + cylinder)

- Cone: $V = \frac{1}{3}\pi r^2 h = \frac{1}{3} \cdot 3.14 \cdot 6^2 \cdot 10 = \frac{1}{3} \cdot 3.14 \cdot 36 \cdot 10 = 376.8 \text{ cm}^3$
- Cylinder: $V = \pi r^2 h = 3.14 \cdot 6^2 \cdot 5 = 3.14 \cdot 36 \cdot 5 = 565.2 \text{ cm}^3$
- **Total:** $376.8 + 565.2 = \boxed{942 \text{ cm}^3}$

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3) Football Trophy (rectangular prism + sphere)

- Base prism: $V = 12 \cdot 10 \cdot 8 = 960 \text{ cm}^3$
- Sphere: $V = \frac{4}{3}\pi r^3 = \frac{4}{3} \cdot 3.14 \cdot 5^3 = \frac{4}{3} \cdot 3.14 \cdot 125 \approx 523.33 \text{ cm}^3$
- **Total:** $960 + 523.33 = \boxed{1{,}483.33 \text{ cm}^3}$

4) Popcorn Container (truncated cone = big cone − small cone)

- Big cone: $V = \frac{1}{3}\pi R^2 H = \frac{1}{3} \cdot 3.14 \cdot 7^2 \cdot 15 = \frac{1}{3} \cdot 3.14 \cdot 49 \cdot 15 = 768.9 \text{ cm}^3$
- Small cone: $V = \frac{1}{3}\pi r^2 h = \frac{1}{3} \cdot 3.14 \cdot 3^2 \cdot 5 = \frac{1}{3} \cdot 3.14 \cdot 9 \cdot 5 = 46.7 \text{ cm}^3$
- **Popcorn volume:** $768.9 - 46.7 = \boxed{722.2 \text{ cm}^3}$

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5) Stadium Bench (rectangular prism + 2 cylinders)

- Seat prism: $V = 180 \cdot 25 \cdot 5 = 22{,}500 \text{ cm}^3$
- One leg: $V = \pi r^2 h = 3.14 \cdot 3^2 \cdot 40 = 3.14 \cdot 9 \cdot 40 = 1{,}130.4 \text{ cm}^3$
- Two legs: $2(1{,}130.4) = 2{,}260.8 \text{ cm}^3$
- **Total material:** $22{,}500 + 2{,}260.8 = \boxed{24{,}760.8 \text{ cm}^3}$

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6) Stadium Archway (half cylinder)

- Half cylinder: $V = \frac{1}{2}\pi r^2 L = \frac{1}{2} \cdot 3.14 \cdot 4^2 \cdot 10 = \frac{1}{2} \cdot 3.14 \cdot 16 \cdot 10 = \boxed{251.2 \text{ m}^3}$