1. The cargo carrying part of Norman's truck has a length of 14 feet, a width of 8 feet, and a height of 5 feet. What is the maximum volume of cargo that Norman can carry? (2 marks)

\[
V = 14 \times 8 \times 5 = 560 \text{ ft}^3
\]

2. A cereal box has a length of \(9 \frac{1}{2}\) inches, a width of \(2 \frac{3}{4}\) inches, and a height of \(12 \frac{7}{8}\) inches. What is the volume of the cereal box? (3 marks)

\[
Vol = 9.5 \times 2.75 \times 12.875
\]

\[
= 336.36 \text{ in}^3
\]

For fun, let's convert to cubic centimeters:

\[
336.36 \times 2.54^3 = 5511.95 \text{ cm}^3
\]

\[
\frac{5511.95}{1000} = 5.51 \text{ L}
\]
3. A set of stairs are shown below:

a) Find the volume of the stairs in cubic feet. (3 marks)

\[
\text{Vol} = 2 \times 4 \times 3 - 1 \times 1 \times 3 \\
\quad \text{whole} \\
\quad = 24 - 3 = \boxed{21 \text{ ft}^3}
\]

b) Calculate how many cubic yards of concrete would be needed to make these stairs. (2 marks)

\[21 \div 27 = 0.78 \text{ yd}^3\]
4. A can of green enchilada sauce has a diameter of 9.8 cm and a height of 11.7 cm.

a) How much enchilada sauce can the can hold? (2 marks)

\[ r = \frac{9.8}{2} = 4.9 \text{ cm} \]

\[ V = \pi r^2 h = \pi \times 4.9^2 \times 11.7 \]

\[ = 882.53 \text{ cm}^3 \]

\[ \frac{882.53}{1000} = 0.8825 \text{ L} \]

\[ 882.53 \text{ mL} \]

b) Convert the volume of the sauce to mL. (1 mark)

5. A can of paint has a diameter of 16.3 cm and a height of 18.8 cm.

a) What is the volume of the paint can? (2 marks)

\[ r = \frac{16.3}{2} = 8.15 \text{ cm} \]

\[ V = \pi r^2 h = \pi \times 8.15^2 \times 18.8 \]

\[ = 3923.04 \text{ cm}^3 \]

\[ \frac{3923.04}{1000} = 3.923 \text{ L} \]

b) Convert the volume to litres. (1 mark)
6. A fish tank has a glass base that is 10 inches by 20 inches. The walls are 12 inches tall.

   a) Sketch and label the fish tank. (1 mark)

   b) Calculate the volume of the fish tank. (2 marks)

   \[ V_{\text{tank}} = 20 \times 10 \times 12 = 2400 \text{ in}^3 \]

   c) How many litres of water will the tank hold if you fill it right to the top?
   There are 2.54 cm in an inch. (2 marks)

   \[ 2400 \times 2.54^3 = 39328.95 \text{ cm}^3 \]

   \[ \div 1000 \]

   \[ 39.33 \text{ L} \]
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7. A propane tank is being converted into a submarine. It consists of a cylinder with half spheres on the ends. The dimensions of the tank are shown below:

a) Calculate the volume of the tank. (4 marks)

\[
\text{Vol} = \frac{1}{2} \text{ sphere} + \frac{1}{2} \text{ sphere} + \text{ cylinder}
\]

\[
= \frac{4\pi \times 1.5^3}{3} + \pi \times 1.5^2 \times 9.
\]

\[
= \frac{14.14}{3} + 63.62
\]

\[
= 77.76 \text{ ft}^3.
\]

\[
\sqrt{77.76} \text{ ft}^3.
\]
8. A wooden block has a hole drilled through it. The hole has a diameter of 2 cm.

Calculate the volume of the wooden block, excluding the drilled hole. (5 marks)

\[ V_{\text{block}} - V_{\text{cyl}} \]
\[ 4 \times 6 \times 6 - \pi \times 1^2 \times 6 \]
\[ 144 - 18.85 \]
\[ V_{\text{vol}} = 125.15 \text{ cm}^3 \]
A concrete beam is to rest on two concrete pillars. The beam is a rectangular prism with sides of length 0.5 m, 3 m and 0.4 m. The pillars have diameter of 0.4 m and a height of 2 m.

Calculate the total volume of concrete needed to make the beam and the pillars. (5 marks)

\[
\text{Beam:}\quad \text{Vol}_{\text{beam}} = 0.5 \times 3 \times 0.4 = 0.6 \text{ m}^3
\]

\[
\text{Pillar:}\quad \text{Vol}_{\text{pillar}} = \pi \times 0.2^2 \times 2 \times 2 = 0.25 \pi \text{ m}^3
\]

\[
\text{Total volume} = 0.6 + 0.50 = 1.1 \text{ m}^3
\]
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10. A bird feeder is shown below: If it is filled to the very top, how many litres of bird feed will it hold? (6 marks)

\[
\begin{align*}
\text{Volume of Cylinder} &= \pi \cdot r^2 \cdot h \\
&= \pi \cdot 3^2 \cdot 9 \\
&= 254.469 \\
\text{Volume of Cone} &= \frac{1}{3} \pi \cdot r^2 \cdot h \\
&= \frac{1}{3} \pi \cdot 3^2 \cdot 7 \\
&= 65.672 \\
\text{Volume} &= 320.14 \text{ in}^3 \times 2.543 \\
&= 5246.19 \text{ cm}^3 \\
&= 5.25 \text{ L}
\end{align*}
\]