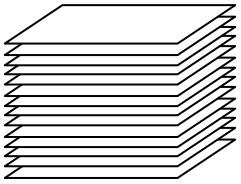
Prisms: Areas and Volume

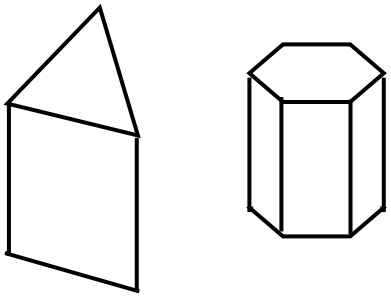
Real World Applications

1. A stack of 'Thank You' cards is piled 12 cm tall. These cards measure 10 cm by 17 cm. What is the volume of the box needed to store these cards? Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.



Note: The figure is not drawn to scale.

2. One child's toy is in the shape of a triangular prism. The base is an equilateral triangle with sides of 12 inches. Another toy is a regular hexagonal prism. The side lengths of the base of the toy is 6 in. If the height of both toys is 17 inches, do they have equal volume? Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.



Note: The figures are not drawn to scale.

3. What is the minimum number of square inches of wrapping paper needed to cover each of the above mentioned toys? Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.

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Answers:

1. $V = l \cdot w \cdot h = 10 \cdot 17 \cdot 12 = 2{,}040 \text{ cm}^3$

2. Triangular prism: $V = \left(\frac{1}{2}\right)(12)(10.4)(17)$

$= 1060.8 \text{ in}^3$

Hexagonal prism: $V = Bh = \left(\frac{1}{2}\right)aP \cdot h$

$= \left(\frac{1}{2}\right)(5.2)(36)(17)$

$= 918\sqrt{3} \approx 1590 \text{ cm}^3$

The volumes are not equal, the hexagonal prism is larger.

3. Triangular prism:

$SA = \frac{1}{2}bh + \frac{1}{2}bh + 3lh$

$= \left(\frac{1}{2}\right)(12)(10.4) + \left(\frac{1}{2}\right)(12)(10.4) + (3)(12)(17)$

$= 736.8 \text{ in}^2$

Hexagonal prism:

$SA = \frac{1}{2}aP + \frac{1}{2}aP + 6lh$

$= \left(\frac{1}{2}\right)(3\sqrt{3})(36) + \left(\frac{1}{2}\right)(3\sqrt{3})(36) + 6(6)(17)$

$\approx 799 \text{ in}^2$