Application Activity

All students in the group will be given a 3 x 5 index card. Students will tape their cards together in an attempt to model the first stage in scale.

Based on their paper cylinder, the students will divide into teams to estimate how many cards are needed to completely cover the lateral surface area of the first stage.

Team estimates will be recorded.

Application Activity

Now Use the formula $L = 2\pi rh$ to determine the actual number of 3 x 5 index cards needed to cover the lateral surface area of the first stage pictured below.

Answer:

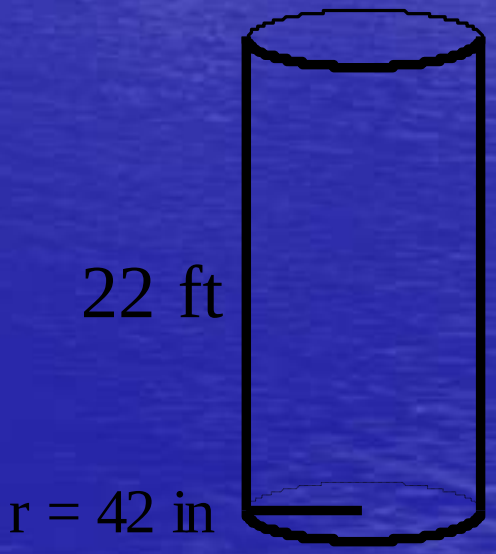
We must convert height to inches

22 ft = 264 inches

$$L = 2\pi(42)(264) \approx 69,668 \text{ in}^2$$

$$\text{One index card} = 3(5) = 15 \text{ in}^2$$

$$\text{Number of index cards} = \frac{69,668}{15} \approx 4,645$$

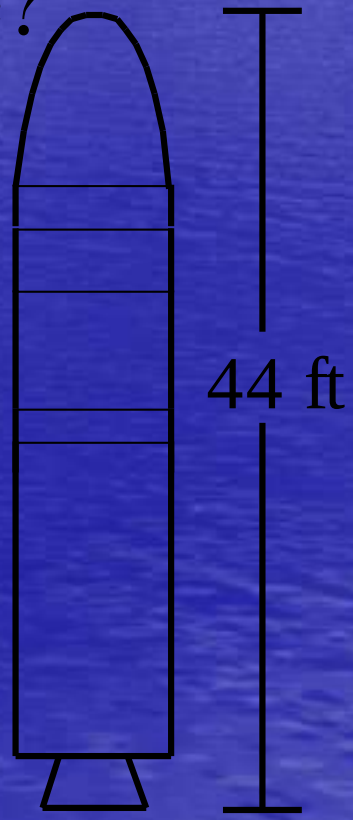


Application Activity

Now Use the formula $L = 2\pi rh$ to determine the actual number of 3 x 5 index cards needed to cover the lateral surface area of the second stage and third stage also.

Application Activity

If you were to construct a cylinder to contain the entire missile on board a modern nuclear submarine, how much total volume of the ship's space would the cylinder require?



Answer:

V = Bh $\quad r = 3.5$ ft $\quad h = 44$ ft

$$\text{B} = \pi r^2 = \pi(3.5)^2 = 12.25\pi \text{ ft}^2$$

$$\text{V} = 12.25\pi(44) = 539\pi \text{ ft}^3 \approx 1,693 \text{ ft}^3$$

Class Discussion

Why is it important to know the volume of a missile tube when planning the construction of a nuclear powered submarine?

Possible answers:

To know how many missiles the submarine can carry.

To know how much space is left for other things such as crew living space, engine space, torpedo space, and control space.

Buoyancy considerations of the submarine.