

When you take your deepest breath, your lungs fill with about 4 L of air. A large freezer bag holds a bit less air than this. What if your lungs were like a large freezer bag? How would the surface area available for gas exchange be different?

Question

How do the alveoli affect the surface area of the lungs available for gas exchange?

Materials

- large freezer bag or alternative with similar dimensions
- scissors
- ruler or measuring tape

Procedure

1. Open the plastic bag fully. Observe how much space there is inside the bag. The maximum amount of air you can inspire into your lungs is about the same as the amount of air that can fit inside the bag.
2. Carefully cut along the crease on each side of the bag so you can unfold the bag and lay it flat, as shown in the photo.
3. Measure the length (long side) and width (short side) of the unfolded bag in centimetres (cm). Record your measurements below.



Long Side	Short Side

4. Multiply the two numbers you measured in step 3. The result is the surface area of the unfolded bag in square centimetres (cm²). This is the same as the surface area of the lungs if they **did not have alveoli**.

_____ x _____ = _____ cm²

Convert this to square meters

_____ ÷ 10000 cm²/m² = _____ m²

5. The area of your lungs with alveoli is about the same size as a regular classroom floor, anywhere from 60 to 100m². Measure the dimensions of your classroom and calculate the area of the floor.

_____ x _____ = _____ m²

Analysis

1. In Procedure step 5, you measured an area using dimensions provided by your teacher. Suggest an area familiar to you that has a similar size.

2. Compare and contrast your surface area calculations. How many times greater is the surface area of the lungs with alveoli than without alveoli?

Big number (m²) divided by small number (m²)

About _____ times bigger.

3. What features of alveoli make them ideal for increasing lung surface area?

Conclusions

4. Could you survive if your lungs did not contain alveoli?

Include the terms surface area, alveoli, blood, cells, oxygen, and carbon dioxide in your answer.

5. How could you demonstrate that a large freezer bag holds nearly 4 L of air?
