

Unit 1. How the lungs work

Activity 1.2



Materials

- 1 500 ml Mason jar (or similar jar or container)
- Three bags of marshmallows (one each of miniature, regular and jumbo)
- A whiteboard and marker

Big things in small packages: The surface area of the lungs

Explain that surface area is the measure of how much of the outside of an object is exposed to the environment around it. You can use various objects in the classroom to give examples.

ASK: "What part of your body do you think has the most surface area?"

Many students will guess that it's the skin. After all, it covers almost the entire body. But the total surface area of the skin is only about 2m^2 .

For a long time, scientists thought that the gut had the most surface area in the body. The surface area of the gut is about 15 times that of the skin (about 30m^2). The large surface area in the gut is important to help the body absorb the nutrients from food.

The lungs have the most surface area of any part of the body. An adult lung is about the size of a large mango. So how does something the size of two large mangos have an inside surface area the same as six parking spaces, about 70m^2 ?

Demonstration

In this activity, we use an empty Mason jar to show how to maximize surface area inside a small object.

1. Fill the jar with the miniature marshmallows (without squishing them in)
2. Record how many marshmallows fit in the jar. It will be approximately 140 marshmallows if using a 500 ml Mason jar.
3. Repeat for the regular and jumbo marshmallows (approximately 12 and 5 marshmallows, respectively).
4. When you've recorded how many of each size marshmallow fit in the jar, use the table below to calculate the total surface area inside the jar in each scenario. The jar with the miniature marshmallows will have the most surface area.

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Item	Diameter	Surface area
Miniature marshmallow	1.5 cm	10 cm ²
Regular marshmallow	2.5 cm	35 cm ²
Jumbo marshmallow	5 cm	100 cm ²

If you're not using marshmallows, you will need to calculate the surface areas of the other objects (marbles, etc.).