

Small Intestine Lab

Purpose: How do villi in the small intestine increase the surface area of the small intestine?

Background Information:

What are villi

Hypothesis:

How do you think villi increase surface area of the small intestine?

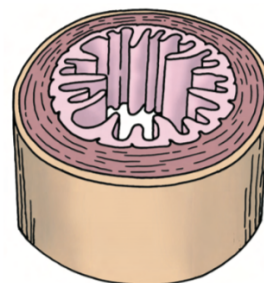
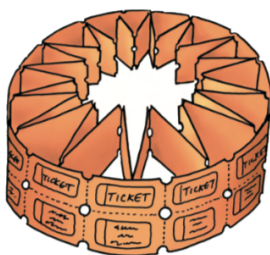
Procedures:

Surface Area of a Clay Cube

1. Remove a lump of clay from the plastic box. Run your fingers over the entire piece of clay.
 - a. How would you define the “surface area” of the clay?
2. Work with your partner, use the ruler to form the clay into a cube that measures 2 cm on each side.
3. Using the formula we discussed in the “go formative”, calculate the surface area of the cube. Write down your answer.
4. With your partner, find a way to increase the surface area of the cube. Your method **MUST** also meet these 2 criteria
 - a. You must **NOT** greatly increase the total volume occupied by the clay. In other words, the clay must **STILL** be able to fit into the white tray it came in.
 - b. You must still be able to calculate the total surface area of the cube.
5. Draw your method in your science notebook.
 - a. Calculate your new surface area
6. Put the clay back into the small white tray

Part 2; Modeling the Inside Surface of the Small Intestine

1. Form a cylinder with the 12-ticket strip. Join the ends of the strip with a small piece of tape.
2. Assuming that one side of each of the two-part ticket has a surface area of approximately 25 square centimeter, what would the total surface area of the inside of the cylinder.
 - a. Write down your answer
3. Fanfold (like the image below) the strip of 30 tickets. Place the fan folded strip of tickets on edge inside the circle of tickets to form an inner layer. Use the small piece of tape to join the ends of the folded strip together.
4. You now have a model showing the folds in the walls of the small intestine. Compare your model, which is illustrated below, with the illustration of the cross-sectional view of the small intestine (2nd picture).
5. Calculate the surface area of the inside of the folded strip of tickets and write down your answer.



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Analyzing Data:

1. How did you increase the surface area of the clay. Explain why you used the strategy you did.
2. What other human organs might need a larger surface area?
3. Why do you think that?
4. How do villi in the small intestine increase the surface area of the small intestine?