**Investigating Surface Area and Volume of Cell Shapes**

Let’s take a look at how much honey could be stored in cells of different shapes.

**Area of a Honeycomb Cell**

How might the **area** of different cell shapes affect honey storage? Let’s investigate by calculating the area of a square and a triangle using the formula provided.

|  |  |  |
| --- | --- | --- |
| **Shape** | **Formula for area** | **Area**  **(in**²) |
| **Square**  Side (S): 2 inches | Side X Side  Or  S² |  |
| **Triangle**  Base (b): 2 inches  Height (h):  2 inches | ½ b X h |  |

What discoveries did you make based on the areas of the triangle and the square? Record them below:

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|  |

Now, based on your earlier investigations, can you come up with the formula for the area of a hexagon? Use your formula to calculate the area of a hexagon with two-inch sides.

|  |  |  |
| --- | --- | --- |
| **Shape** | **Formula for area** | **Area**  **(in**²) |
| **Hexagon**  Sides: 2 inches |  |  |

**How did you find the area of the hexagon?** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
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**Was there only one way to calculate the area of the hexagon? Explain.**

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**Is your calculation the same or different from what other groups calculated?**

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**Now check your work for precision and accuracy.** Your teacher will provide you with the mathematical formula for the area of a hexagon. Calculate the area using the formula given, and check how your new calculation compares to your previous one. Is it the same or different? Is your new calculation the same or different from what other groups got?

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**Volume of a Honeycomb Cell**

Let’s see how the **volume** of different cell shapes might affect honey storage.

* Create triangular and square cells from the prism templates provided.
* Pour sand to the top of the cells, and level the sand off.
* Measure the volume of sand you poured into the cells by transferring the sand into graduated cylinders. Record the volume for each shape in the table below.

|  |  |
| --- | --- |
| **Shape** | **Volume**  **(ml)** |
| **Square** |  |
| **Triangle** |  |

Based on your earlier investigations, can you find the volume of a hexagon-shaped cell using the square and/or triangular prisms?

|  |  |
| --- | --- |
| **Shape** | **Volume**  **(ml)** |
| **Hexagon** |  |

|  |  |  |
| --- | --- | --- |
| **Question** | **Drawing of Cell Shape** | **Explain your answer using evidence from your investigations.** |
| Which shape had the greatest **area** for honey storage? |  |  |
| Which shape had the smallest **area** for honey storage? |  |  |
| Which shape had the greatest **volume** for honey storage? |  |  |
| Which shape had the smallest **volume** for honey storage? |  |  |

**What can you conclude about the shapes of cells from this investigation of area and volume?** Based on your results, which shape would work best as a honeycomb cell, and why? Use evidence to support your thinking.

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