**STUDENT WORKSHEET: Sea Spider Legs and Diffusion** Name_____

| Sea Spider Leg diameter | Sea Spider Leg perimeter | Surface Area of Sea Spider Leg* | Volume in the Sea Spider Leg segment* | Volume in Sea Spider Leg reached by vinegar* | Surface area- to-volume ratio | % of leg tissue reached by vinegar |
|---|---|---|---|---|---|---|
| cm | cm | $cm^2$ | $cm^3$ | $cm^3$ | | % |
| cm | cm | $cm^2$ | $cm^3$ | $cm^3$ | | % |
| cm | cm | $cm^2$ | $cm^3$ | $cm^3$ | | % |
| cm | cm | $cm^2$ | $cm^3$ | $cm^3$ | | % |

*Calculate using a sea spider leg segment that is 10 cm in length.

Calculate the surface area of a cylinder using the equation $A=2\pi rh+2\pi r^2$

Calculate the volume of a cylinder using the equation $V=\pi r^2 h$

*r* = radius = 0.5 * diameter

*h = height*

Surface area-to-volume ratio = A/V

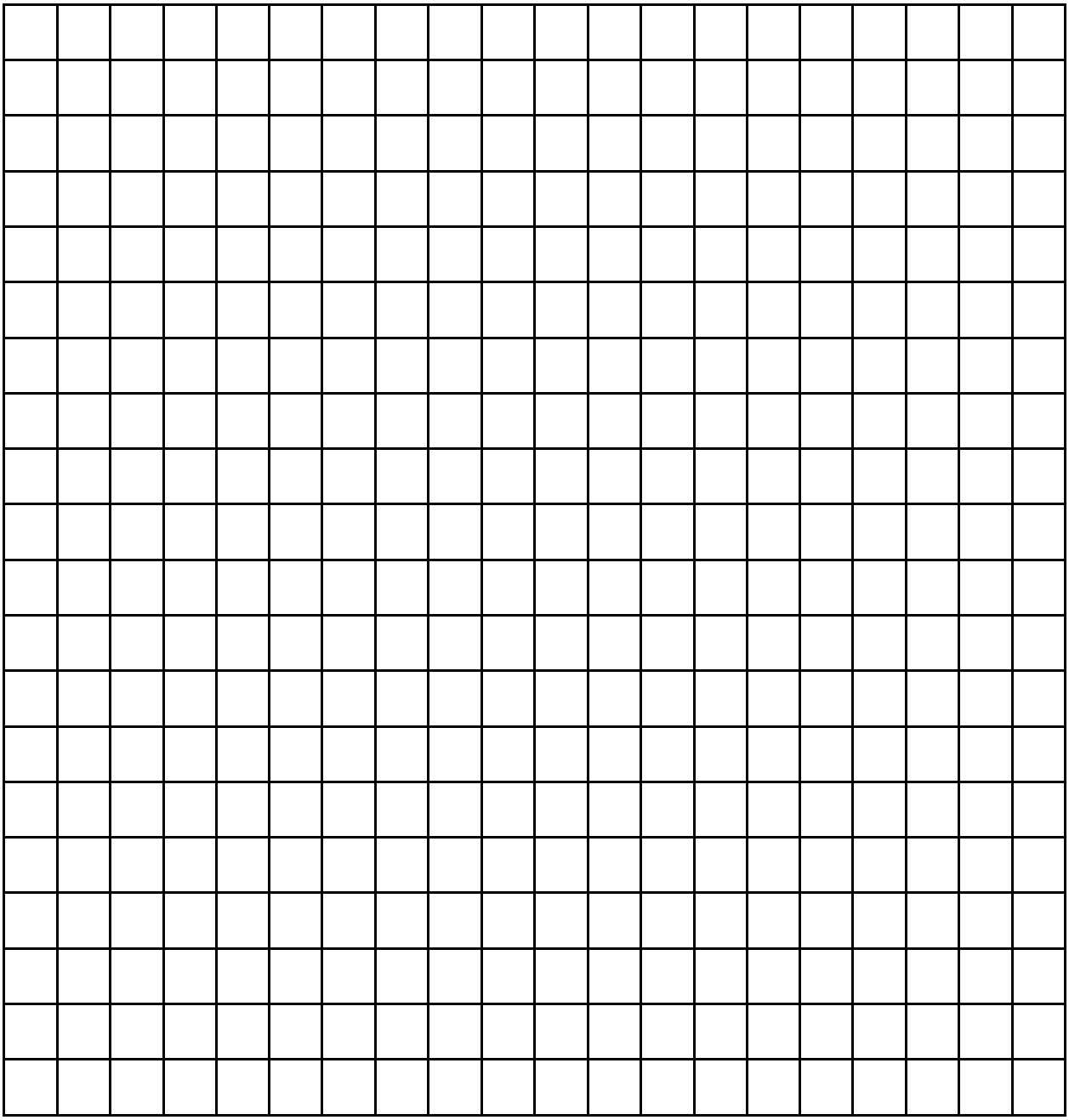
In the last column, calculate the percentage of the volume of a sea spider leg reached by diffusing vinegar using this formula: **((volume of leg reached by vinegar)÷(total volume in the sea spider leg segment)) * 100.**

**Reflection Questions:**

1) **In your own words, compare the diffusion of vinegar between the sea spider legs of different diameters. Is vinegar moving into one more quickly than the other(s)?**

2) **Which diameter (small or large) of sea spider leg had most of its internal area touched by vinegar?**

3) **Use your data to graph the relationship between the surface area-to-volume ratios and the percentage of the spider leg into which vinegar diffused over five minutes.**



4) **If sea spiders only get their oxygen through diffusion across their "skin," how do you think this might affect the size to which they're able to grow?**