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**Volume of Cylinders**

* Goals
	+ Students will discover the relationship between the dimensions of a rectangle and the volume of its cylinder
* Objectives
	+ Given 20 boxes, students will create cylinders and find their volumes with 100% accuracy
* Materials
	+ Paper
	+ Scissors
	+ Tape
	+ Plate
	+ M&M’s

1. Fill in the height and width of all possible rectangles in the table (attached).

2. Construct cylinders out of your rectangles by taping the edges together, making sure the height of your rectangle is the height of your cylinder.

3. **PREDICT**… Which cylinder do you think has the GREATEST volume (holds the most M&M’s)? Which cylinder do you think has the LEAST volume? Explain.

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* Pick any two cylinders and stand them up on your plate, one inside the other
* Completely fill the inner cylinder with M&M’s
* Now, lift the inner cylinder and let the M&M’s fill the outer cylinder
	+ If all the M&M’s do NOT fit in the outer cylinder (it over-flows), then its volume is less than the inner cylinder
	+ If all the M&M’s do fit in the outer cylinder and there is still room for more, then its volume is greater than the inner cylinder
	+ If all the M&M’s fit exactly in to the outer cylinder with no extra space, then the two cylinders have the same volume

4. Do you see any connection between the sizes of the cylinders and the amounts they hold?

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* Now, we want to use mathematical equations to confirm our results!
* $Volume= πr^{2}h$, where…
	+ r = radius of the base
	+ h = height of the cylinder
* We can see the height of each cylinder by looking at the height of the rectangle we used to construct it
* How can we solve for the radius?
* To solve for the radius of the base of the cylinder, we must look at its circumference
* The circumference of the base is equal to the width of the rectangle!
* $Circumference=2πr$, where…
	+ r = radius of the base of the cylinder

5. Using the guidelines above, find the radius, circumference, and volume of each cylinder and fill in the table (attached).

6. Were your predictions correct?

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| --- | --- | --- | --- | --- |
| *Height**(h)* | *Width**(w)* | *Circumference**(C)* | *Radius**(r)* | *Volume**V =* $π$*r2h* |
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