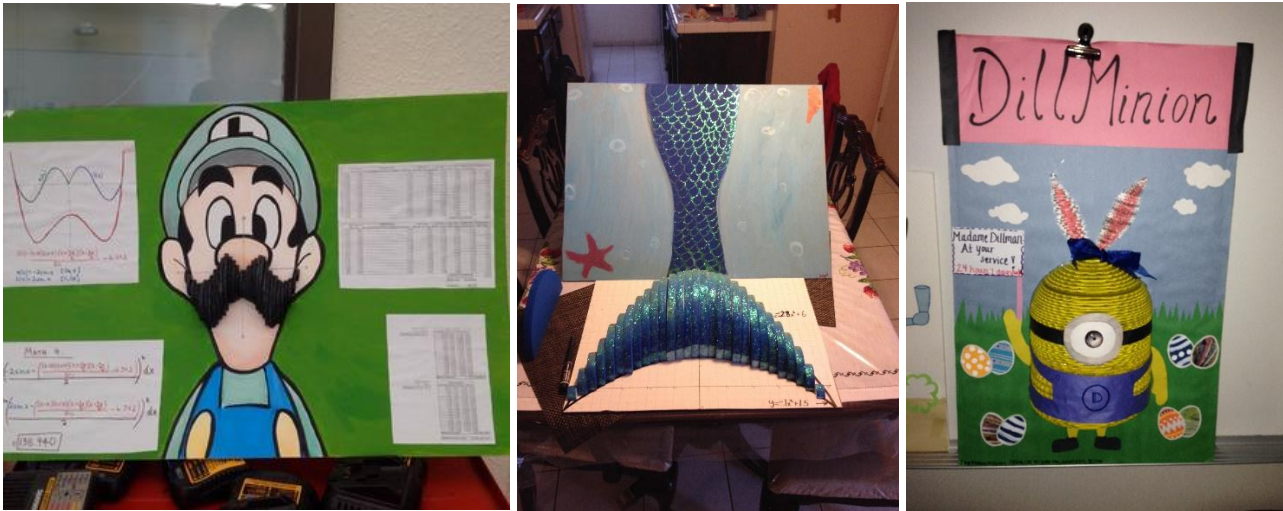


Calculus Project - Volumes of Solids with Known Cross Section

Make a physical model of a solid with a known cross section on a base with a standard function. The following guidelines apply:



- 1) The base function(s) can be any non-linear function except a parabola, square root, or absolute value. (If using 2 functions, the 2nd can be any of your choice).
- 2) The cross section can be any shape except a rectangle of constant height. If you choose a square or rectangle of changing height, your max grade will be a 90.
- 3) For the model, the materials can be no thicker than 0.5". Your model must be at least 6 inches long and have at least 12 cross sections.
- 4) Bonus points will be given for final shapes that look like a real-life object.

With your model, you must turn in the following:

1. A detailed graph of your base. You must partition your base into at least 12 partitions, with each partition being no more than a .5 inch wide. The partitions do not need to match the thickness of your actual building material.
2. Estimate the volume of your solid, using a Reimann Sum and your Δx . You can use a left, right, or midpoint Reimann Sum. Show all work in an organized manner.
3. Write and solve (by hand) a definite integral to find the exact volume of your solid. You must show all work that leads to your solution.

		Calculus Rubric: Volumes of Cross Section		names:
		PROFICIENT	ADVANCED	
Model	40	<ul style="list-style-type: none"> • Solid is mounted on a board(not poster board or butcher paper.) (5) • Material for cross sections are no more than .5" thick.(5) • Solid is at least 6 inches long. (5) • At least 12 cross sections are present on the model. (5) • Model is neat and shows attention to detail. (5) • Rubric is turned in with project with all group members names.(5) 	In addition to PROFICIENT criteria ... <ul style="list-style-type: none"> • Model depicts a character or object.(5) • Model is exceptionally neat and well constructed.(5) 	
		0-----30	30 - - - - - 40	
Content Calculus Information	45	<ul style="list-style-type: none"> • First base equation is nonlinear, and is not quadratic, square root, or absolute value. (5) • Base is graphed neatly on graph paper with partitions shown.(5) • All work for the estimation of the volume using a Reimann Sum is shown.(5) • Integral and all work are shown clearly for the exact volume.(5) • Answers are correct. (10) 	In addition to PROFICIENT criteria ... <ul style="list-style-type: none"> • Base equation(s) and cross sections are of a higher difficulty.(5) • Work is typed using an equation editor.(5) • Midpoint Sum is used instead of left or right.(5) 	
		0-----30	30 - - - - - 45	
Collaborative Work	15	These last 15 points will be a combination of teacher and partner input on how well your time is used, and how well you work as a team.		

Grading Comments:

Final Grade

Calculus Project - Volumes of Revolution

Make a physical model of a Volume of Revolution about the x or y-axis.



The following guidelines apply:

- 1) The function(s) can be any non-linear function except a parabola, square root, or absolute value. (If using 2 functions, the 2nd can be any of your choice).
- 2) The materials can be no thicker than 0.5". Your model must be at least 6 inches long and have at least 12 circular cross sections.
- 3) Bonus points will be given for final shapes that look like a real-life object.

With your model, you must turn the following:

1. A detailed graph of the function you are rotating with boundaries marked. You will partition this shape into at least 12 partitions, with each partition being no more than a $\frac{1}{2}$ inch wide. The partitions do not need to match the thickness of your actual building material.
2. Estimate the volume of your solid, using a Reimann Sum and your Δx . You can use a left, right, or midpoint Reimann Sum. Show all work in an organized manner.
3. Write and solve (by hand) a definite integral to find the exact volume of your solid. You must show all work that leads to your solution.

		Calculus Rubric: Volumes of Rotation	
		names:	
		PROFICIENT	ADVANCED
Model	40	<ul style="list-style-type: none"> • Solid is constructed with a string, dowel, or wire through the center. (5) • Material for cross sections are no more than .5" thick.(5) • Solid is at least 6 inches long. (5) • At least 12 cross sections are present on the model. (5) • Model is neat and shows attention to detail. (5) • Rubric is turned in with project with all group members names.(5) 	In addition to PROFICIENT criteria ... <ul style="list-style-type: none"> • Model depicts a character or object.(5) • Model is exceptionally neat and well constructed.(5)
		0-----30	30 - - - - - 40
Content Calculus Information	45	<ul style="list-style-type: none"> • First equation is nonlinear, and is not quadratic, square root, or absolute value. (5) • Function is graphed neatly on graph paper with partitions shown.(5) • All work for the estimation of the volume using a Reimann Sum is shown.(5) • Integral and all work are shown clearly for the exact volume.(5) • Answers are correct. (10) 	In addition to PROFICIENT criteria ... <ul style="list-style-type: none"> • Equation(s) are of a higher difficulty.(5) • Work is typed using an equation editor.(5) • Midpoint Sum is used instead of left or right.(5)
		0-----30	30 - - - - - 45
Collaborative Work	15	These last 15 points will be a combination of teacher and partner input on how well your time is used, and how well you work as a team.	