MAP4C Culminating Activity

Design Project: Keeping the Kandies

You are applying for a job with The N & N Kandy Company's packaging department. As part of the application process, the company has requested that you prepare a report suggesting possible packaging alternatives for their candies.

Notes

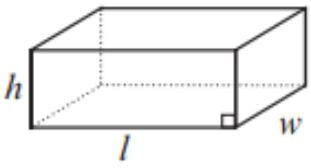
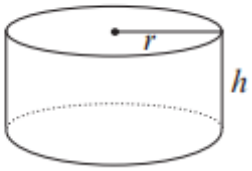
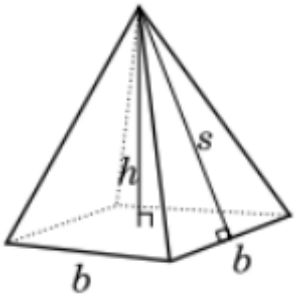
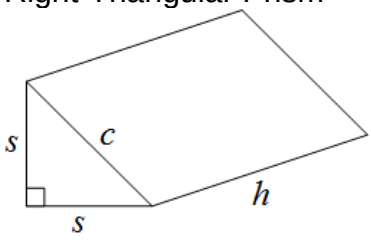
- You must complete this project on your own, however you can consult with a partner.
- You may use your course textbook, notes as well as the iPads and internet resources.
- You MUST show all of your work. Correct answers with no work shown receive no marks.
- Aside from your partner, you may not communicate with other students during this project. If I see you talking to other students in the class, I will have to assume you are already finished the project and will collect it for marking at that point.
- Many parts of this activity will build on the work done in previous parts.
- This activity is worth 4% of your final mark.

Due Date: Friday, June 13

/85

Name: _____

Formula Sheet

Geometric Figure	Surface Area	Volume
Rectangular prism 	$SA = 2lh + 2lw + 2wh$ $SA = 2(lh + lw + wh)$	$V = area\ of\ base \times height$ $V = lwh$
Cylinder 	$SA = 2\pi r^2 + 2\pi rh$	$V = area\ of\ base \times height$ $V = \pi r^2 h$
Square-Based Pyramid 	$SA = b^2 + 4\left(\frac{bs}{2}\right)$ $SA = b^2 + 2bs$	$V = \frac{area\ of\ base \times height}{3}$ $V = \frac{b^2 h}{3}$
Right-Triangular Prism 	$SA = 2\left(\frac{s^2}{2}\right) + 2sh + ch$ $SA = s^2 + 2sh + ch$	$V = area\ of\ base \times height$ $V = \frac{s^2}{2} \times h$

Name: _____

Part 1 – Containing the Candies (25 marks)

The company has indicated that the package must contain 500 candies, each having a volume of 0.4cm^3.
In addition to the size, the material cost is a consideration for the department.

What is the necessary volume of each package of candies? _____
(1 mark)

You are told that the package will either be a *rectangular prism*, a *right isosceles triangular prism, a square-based pyramid* or a *cylinder*. You must design one container for the 500 candies for **each** of these 3-D shapes. Your design must include a 3-D sketch labelled with the appropriate dimensions, the volume calculation to verify the package is the correct size and the surface area calculation. Your dimensions should not be the same as someone else's.

Rectangular Prism (6 marks)

3-D Sketch	Volume Calculation
	Surface Area Calculation

Name: _____

Square-Based Pyramid (6 marks)

3-D Sketch	Volume Calculation
	Surface Area Calculation

Name: _____

Right Isosceles Triangular Prism (6 marks)

3-D Sketch	Volume Calculation
	Surface Area Calculation

Name: _____

Cylinder (6 marks)

3-D Sketch	Volume Calculation
	Surface Area Calculation

Name: _____

Part 2, 3 – Keeping The Material Costs Low (50 marks)

The company was impressed with your first submission, and would like you to further investigate packaging solutions for the candies.

The N&N Kandy Company would now like you to choose one of the above shapes for their container. The container you choose should be both aesthetically pleasing and also keep the material costs low. Your choice must be justified, so your report must include calculations for the optimal surface area of all shapes.

Notes:

- The material for the packaging costs $\$0.0005/cm^2$.
- All costs must be rounded to the nearest tenth of a cent.

Steps for the Rectangular prism and the Cylinder

1. Find the dimensions that will **minimize** the surface area of the package that the company requires for its candies.
2. Determine the cost of the material that produces one package.
3. Draw a 3-D sketch of this package design.

Rectangular Prism (10 marks)

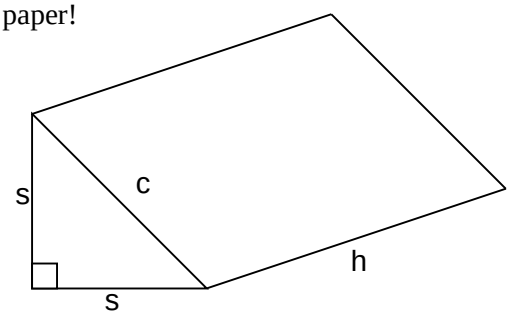
Name: _____

Cylinder (10 marks)

Name: _____

To determine the optimal surface area for the triangular prism shown below, fill in the table below and draw a rough graph of side length (S) vs. Surface Area with a curve of best fit. Round all answers to the nearest tenth. Attach your rough work on lined paper!

Right Triangular Prism (15 marks)



S (cm)	h	c	Surface Area
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

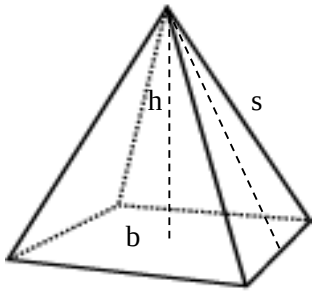
Sketch of Graph

Optimal Dimensions and Cost

Name: _____

To determine the optimal surface area for the square-based pyramid shown below, fill in the table below and make a rough graph of base length (b) vs. Surface Area with a curve of best fit. Round all answers to the nearest tenth. Attach your rough work on lined paper!

Square-Based Pyramid (15 marks)



b (cm)	h	s	Surface Area
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Sketch of Graph

Optimal Dimensions and Cost

Name: _____

Part 4 - Final Report (5 marks)

Once you have completed all calculations, summarize your findings below and give your recommendation for which shape the company should use for the new N&N Kandy's package and its dimensions. Remember to justify your choice.

Name: _____

Part 5 – Considering Candy Packaging Costs (5 marks)

The American arm of the company has found that they can get the same material to make the package for $\$0.0033/in^2$ (CAD).

Calculate the cost of packaging for the container you chose.

Conversions

Cost

The packages are to be manufactured in Canada. Would you recommend using the original material (from a Canadian supplier) or the material from the American supplier? Be sure to justify your choice.