

The Great NC Bake Off *This activity should take about 3 days*

Enrichment Investigation #1

NC State Standard(s):

NC.5.MD.4
NC.5.MD.5

Standard(s) for Mathematical Practice:

1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
4. Model with mathematics
6. Attend to precision
7. Look for and make use of structure

Materials Needed:

- Blackline Masters:
 - “The Great North Carolina Bake Off” (5 pages)
- Construction paper or note cards for descriptions
- Art supplies for pictures of cake design

Instructions:

1. Provide students will copies of blackline master, “The Great North Carolina Bake Off”
2. Review rules, guidelines and examples. (remind students that they should creative)
3. Supply presentation materials (this may include: notecards, constructions paper, posters, etc.) Students will have to show their mathematical thinking and their ability to think creatively as they develop their cake designs.
4. *Optional: You may want to think of a creative way for students to present their final cakes or incorporate a STEM activity where they use materials to build models or the cakes. They could also record videos explaining their designs.

Sources:

- Adapted from: <https://www.sausd.us/>

4C’s Competencies:

Collaboration:

- Peers will review their designs with each other to get feedback.

Creativity:

- Express ability to use volume and area to create designs and show thinking in creative presentations.

Communication:

- Present understanding and knowledge of are and volume.

Critical Thinking:

- Work to solve complex problems while seeing volume in a new perspective.

The Great North Carolina Bake Off

CONGRATULATIONS

You have been invited to participate in the first North Carolina Bake Off! You will be asked to design and create 3 fabulous cake for competition! It is important to incorporate all your math knowledge and creativity into the design process. Remember that all designs should follow the requirements listed and be as creative as possible.



GOOD LUCK BAKERS!!

Please fill out your entry form

Name(s) of Contestants: _____

Team Logo Design:

A large, empty rounded rectangular box with a red border, intended for the team logo design.

Name of three cake entries: (complete after cakes have been designed)

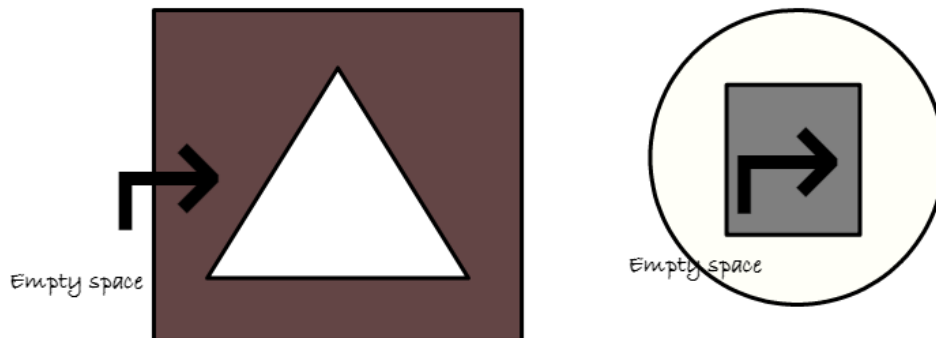
1. _____
2. _____
3. _____

The Great North Carolina Bake Off

Rules and Guidelines

1. You must create three different cakes.
2. All cakes require a missing section. (see example below)
3. All cakes should have a unique design (be creative)
4. For each cake:
 - Calculate the area and volume of the cake using 2 different strategies.
 - Write a description of the cake to be presented next to each cake design. The description should include information about the taste, design and layout of the cake.
 - “Take a photo” and place this with your cake description card. (photo can be drawing of the cake)
 - For each cake the entry must be complete and include the following:
 - Entry form
 - Evidence of strategies used to find area and volume
 - Cake description card
 - Cake “photo”

CAKE EXAMPLES:



****These are challenge examples students may use different area formulas for the shape they select as the cut out.**

The Great North Carolina Bake Off

Cake Entry Form

Complete one Area and Volume form for each of your cake designs. Cake must have a minimum of 2 layers, but you can add as many as you like.

Name of cake: _____

Layer 1:

Area of the outside: _____

Volume of the outside of the cake: _____

Area of the shape removed from the cake center: _____

Volume of the shape removed from the cake center: _____

Layer 2:

Area of the outside: _____

Volume of the outside of the cake: _____

Area of the shape removed from the cake center: _____

Volume of the shape removed from the cake center: _____

Optional

Additional Layers:

The Great North Carolina Bake Off

Cake Entry Form Continued

Area calculations: (show multiple strategies)

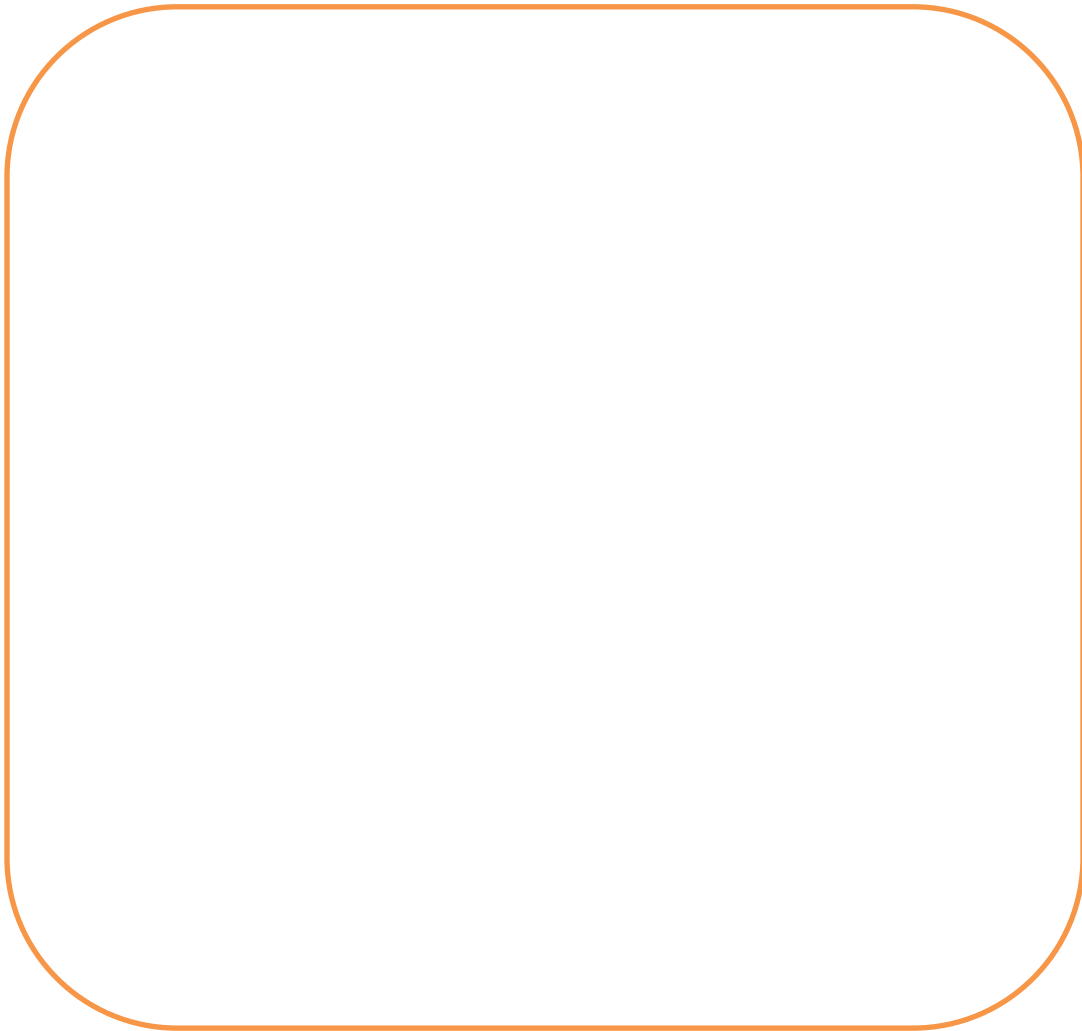
Volume calculations: (show multiple strategies)

Diagram of cake:

The Great North Carolina Bake Off

Cake Photos

- Sketch a photo for each of your cakes
- Add labels for special features (flavors, decorations and details)
- Include a cut out photo to show the inside filling of your cake



*** You will also need to include a description card for your cake including information, details, flavor, taste, and design. You will need a description card for each cake.

Boxing up the Cakes

Enrichment Investigation #2

NC State Standard(s):

NC.5.MD.4
NC.5.MD.5

Standard(s) for Mathematical Practice:

1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
3. Construct a viable argument and critique the reasoning of others.
4. Model with Mathematics
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning

Materials Needed:

- Blackline Masters:
 - “Boxing up the Cakes” & “Reflecting on Volume”
- Graph paper
- Math journal

Instructions:

1. Share materials with students. (they may work in a group or independently) Explain they will need to use what they know about volume to solve a real-world problem. They will have to discuss and come up with a plan they agree on before composing their responses.
2. Students will work to complete the chart. They will use graph paper to create a diagram and must show all their thinking on separate paper.
3. Once students have completed the chart, they should discuss with a group their results. They will also answer the volume reflection questions in their math journals

Sources:

- Adapted from: <https://www.sausd.us/>

4C’s Competencies:**Collaboration:**

- Peers will review plans with each other to get feedback and think through reflective practice.

Creativity:

- Express ability to use volume and area to create designs and show thinking in creative problem solving

Communication:

- Discuss findings with peers as they work through possible solutions.

Critical Thinking:

- Use a variety of problem solving strategies to solve complex real-world problems.

BOXING UP THE CAKES

Name: _____ Date: _____

It's time to ship your cakes to the Bake-Off site! You must very careful with your shipment since once the cakes arrive they will be set out for judging.

You have decided to ship your cakes with several other bakers that entered the competition to save money on shipping costs.

You have different sized boxes from each baker and you need to load the truck perfectly.

- Your boxes are the largest. They are 3ft. long, 3ft. wide and 2ft. high.
- The Sweet Treats Bakery has boxes that are 2ft. long, 3ft. wide and 2ft. high.
- Just Desserts Bakery has boxes that are 2ft. long, 2ft. wide and 3ft high.

The shipping company told you that the boxes have the same amount of space. You want to figure out if they are right. You will need to check that all the boxes will fit in the back of the truck.

- The dimensions for the truck are 6ft. long, 3 ft. wide and 5 ft. high.

(Make the boxes using graph paper. Each centimeter will represent 1 foot to recreate the boxes and the bed of the truck.) (Show work on separate paper)

Box	Diagram	Length	Width	Height	Volume
Your Bakery					
Sweet Treats					
Just Desserts					
Total		X	X	X	
Box	Diagram	Length	Width	Height	Volume
Truck					

Reflecting on Volume

Discuss this scenario with your group. Did the boxes fit in the truck? If they did not, explain why.

How did the boxes fit from each of the bakeries in the truck? Explain how many boxes and how they fit.

If the volume of the boxes is less than the volume of the truck, will the boxes always fit?

If a 4th box will fit and what would the dimensions of that box be.

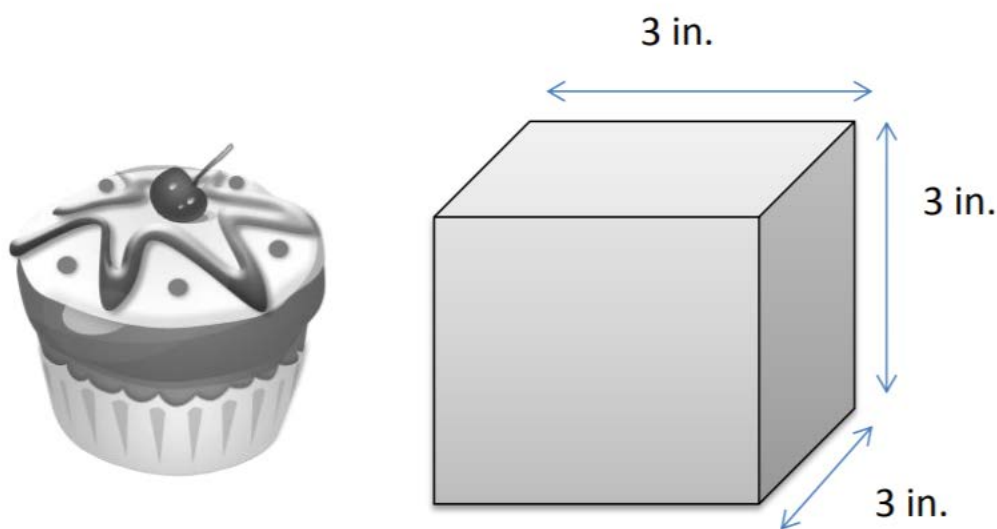
If your boxes were half the size of the originals, how many could you fit?

Why is it important to know how to measure volume?

World of Cupcakes	
Enrichment Investigation #3	
NC State Standard(s): NC.5.MD.4 NC.5.MD.5	Standard(s) for Mathematical Practice: 1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantifiably 4. Model with Mathematics 5. Use appropriate tools strategically 6. Attend to precision 7. Look for and make use of structure 8. Look for and express regularity in repeated reasoning
Materials Needed: <ul style="list-style-type: none"> • Blackline Masters: <ul style="list-style-type: none"> ○ <i>World of Cupcakes</i> • Graph paper • Art supplies for box design 	
Instructions: <ol style="list-style-type: none"> 1. Students review the cupcake box problem. They work to develop possible solutions using creative strategies and what they know about volume. 2. Describe all the possible solutions and dimensions for the cupcake box and select a design and create the box using a diagram. (students may also create a net and create a 3-D model of the cupcake box as well) 3. Students can then share their designs within a group. 	
Sources: <ul style="list-style-type: none"> • Adapted from: https://www.sausd.us/ 	
4C's Competencies:	
Collaboration: <ul style="list-style-type: none"> • Share ideas with group to work on possible solutions for design. 	Creativity: <ul style="list-style-type: none"> • Express ability to use volume to create designs and show thinking in creative diagrams and models.
Communication: <ul style="list-style-type: none"> • Present understanding and knowledge of are and volume. 	Critical Thinking: <ul style="list-style-type: none"> • Work to solve complex problems while seeing volume in a new perspective.

The World of Cupcakes

Your cakes were such a success at the bake off that now you decided to now sell the cupcake version at your bakery. When you sell individual cupcakes, you package each cupcake in a cube-shaped box. Each box measures 3 inches in length, width, and height.



Individual Cupcake Box

1. Since the cupcakes have been so popular, you want to design a new box that holds 6 cupcakes. The new 6-pack cupcake box must

- be a rectangular prism;
- provide each cupcake with the same dimensions of space as an individual cupcake box provides; and
- measure 3 inches in height

Describe, in words, all the 6-pack box designs that will fit these conditions.

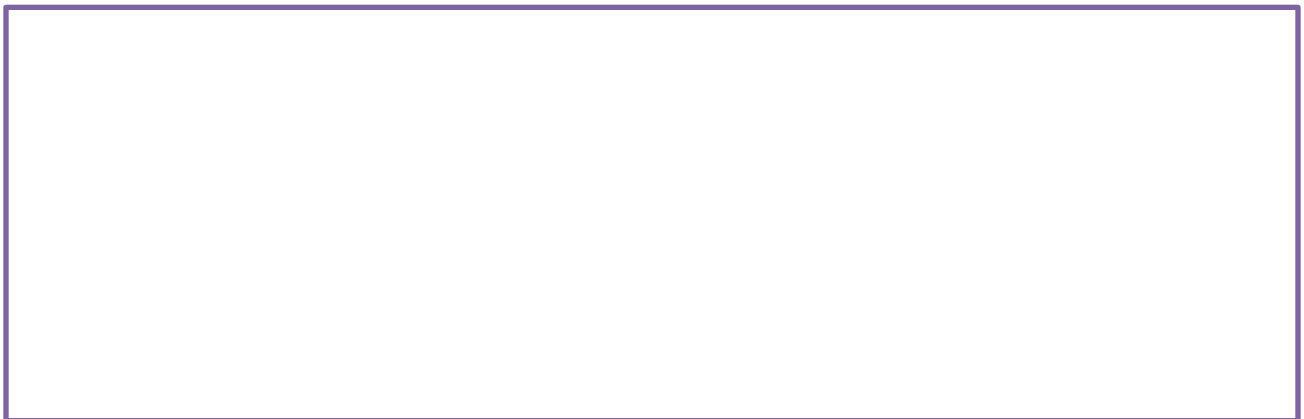
(There should be several options)

New Cupcake Box Design:

Create a model of your cupcake box. Draw the net onto the graph paper and cut it out to turn in. Draw a draft of your design below.



Describe in words all the possible designs that fit the criteria for the new cupcake box.



Answer Key

CONGRATULATIONS

You have been invited to participate in the first North Carolina Bake Off! You will be asked to design and create 3 fabulous cake for competition! It is important to incorporate all your math knowledge and creativity into the design process. Remember that all designs should follow the requirements listed and be as creative as possible.



GOOD LUCK BAKERS!!

Please fill out your entry form

Name(s) of Contestants: _____ **Top Bakers** _____

Team Logo Design:



Name of three cake entries: (complete after cakes have been designed)

1. _____ **NC State red velvet surprise** _____
2. _____ **NC mud pudding bake** _____
3. _____ **DUKE devils food cake** _____

the cut out.

The Great North Carolina Bake Off

Cake Entry Form

Complete one Area and Volume form for each of your cake designs. Cake must have a minimum of 2 layers, but you can add as many as you like.

Name of cake: _____

Layer 1:

Area of the outside: _____

Volume of the outside of the cake: _____

Area of the shape removed from the cake center: _____

Volume of the shape removed from the cake center: _____

Layer 2:

Area of the outside: $A=10 \times 6$ (60sqin) _____

Volume of the outside of the cake: $V=10 \times 6 \times 3$ (180sqin) _____

Area of the shape removed from the cake center: $A=6 \times 6$ (36sqin) _____

Volume of the shape removed from the cake center: $V=6 \times 6 \times 3$ (108sqin) _____

Optional

Additional Layers:

The Great North Carolina Bake Off

Cake Entry Form Continued

Area calculations: (show multiple strategies)

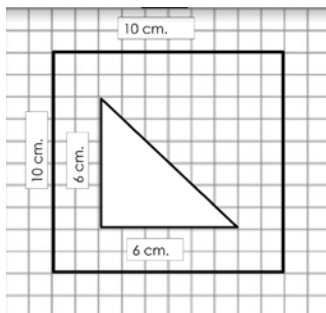
Answers will vary

Volume calculations: (show multiple strategies)

Answer will vary

Diagram of cake:

Ex:



BOXING UP THE CAKES

Name: _____ Date: _____

It's time to ship your cakes to the Bake-Off site! You must very careful with your shipment since once the cakes arrive they will be set out for judging. You have decided to ship your cakes with several other bakers that entered the competition to save money on shipping costs. You have different sized boxes from each baker and you need to load the truck perfectly. Your boxes are the largest. They are 3ft. long, 3ft. wide and 2ft. high. The Sweet Treats Bakery has boxes that are 2ft. long, 3ft. wide and 2ft. high. Just Desserts Bakery has boxes that are 2ft. long, 2ft. wide and 3ft high. The shipping company told you that the boxes have the same amount of space. You want to figure out if they are right. You will need to check that all the boxes will fit in the back of the truck. The dimensions for the truck are 6ft. long, 3ft. wide and 5 ft. high.

(Make the boxes using graph paper. Each centimeter will represent 1 foot to recreate the boxes and the bed of the truck.) (show work on separate paper)

Box	Diagram	Length	Width	Height	Volume
Your Bakery	Student created	3	3	2	18ftcuded
Sweet Treats	Student created	2	3	2	12ftcubed
Just Desserts	Student created	2	2	3	12ftcubed
Total	Student created	X	X	X	42ftcubed
Box	Diagram	Length	Width	Height	Volume
Truck	Student created	6	3	5	90ftcubed

Reflecting on Volume

Allow students to discuss with their group the scenario and if the boxes fit in the truck or if they did not. If it would not work and explain why. *(Record responses in your math journal)*

How did the boxes fit from each of the bakeries in the truck? Explain how many boxes and how they fit.

6 boxes will fit (2 from each bakery). Show diagram or net to prove solution

Total volume of boxes is 42sqft

$42 \times 2 = 84$ ft cubed if you added one more box with a volume of 12ft cubed it would equal 96 ft cubed and not fit on the truck.

If the volume of the boxes is less than the volume of the truck, will the boxes always fit?

Not always, just because the volume is less than or the same as the truck bed doesn't mean the boxes will always fit. They need to consider the dimensions of the boxes.

If a 7th box will fit and what would the dimensions of that box be.

The total volume of the 7th box would have to equal 4 ft cubed so the dimensions would be 2ftx2ftx1ft to fit on the truck.

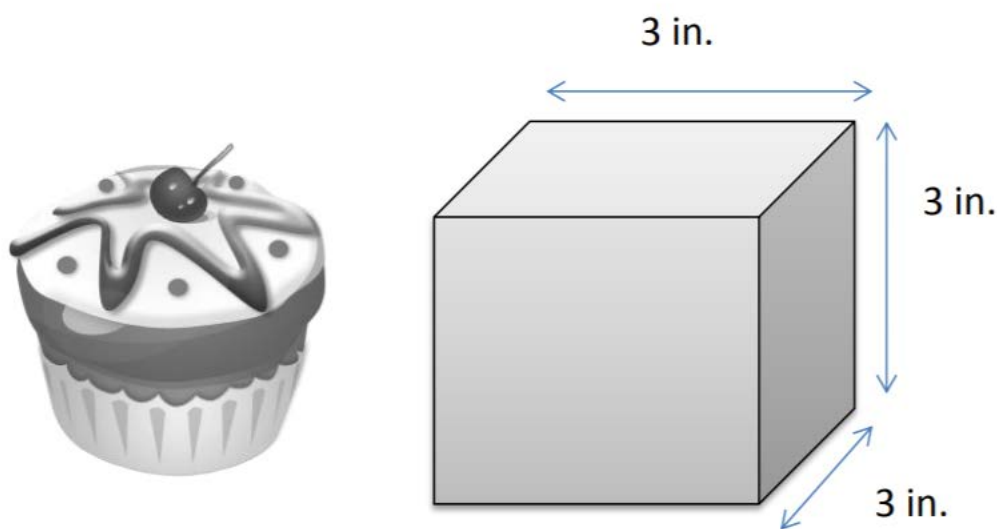
If your boxes were half the size of the originals, how many could you fit?

About triple the amount of boxes will fit. Since volume is cubed there will be about triple the room on the truck. $1.5 \times 1.5 \times 1 = 2.25$ $1 \times 1 \times 1.5 = 1.5$ $1 \times 1.5 \times 1 = 1.5$ total volume of 5.25 so about 17 boxes will fit on the truck with a total volume being 89.25ft cubed.

Why is it important to know how to measure volume? *Answer will vary*

The World of Cupcakes

Your cakes were such a success at the bake off that now you decided to now sell the cupcake version at your bakery. When you sell individual cupcakes, you package each cupcake in a cube-shaped box. Each box measures 3 inches in length, width, and height.



Individual Cupcake Box

1. Since the cupcakes have been so popular, you want to design a new box that holds 6 cupcakes. The new 6-pack cupcake box must

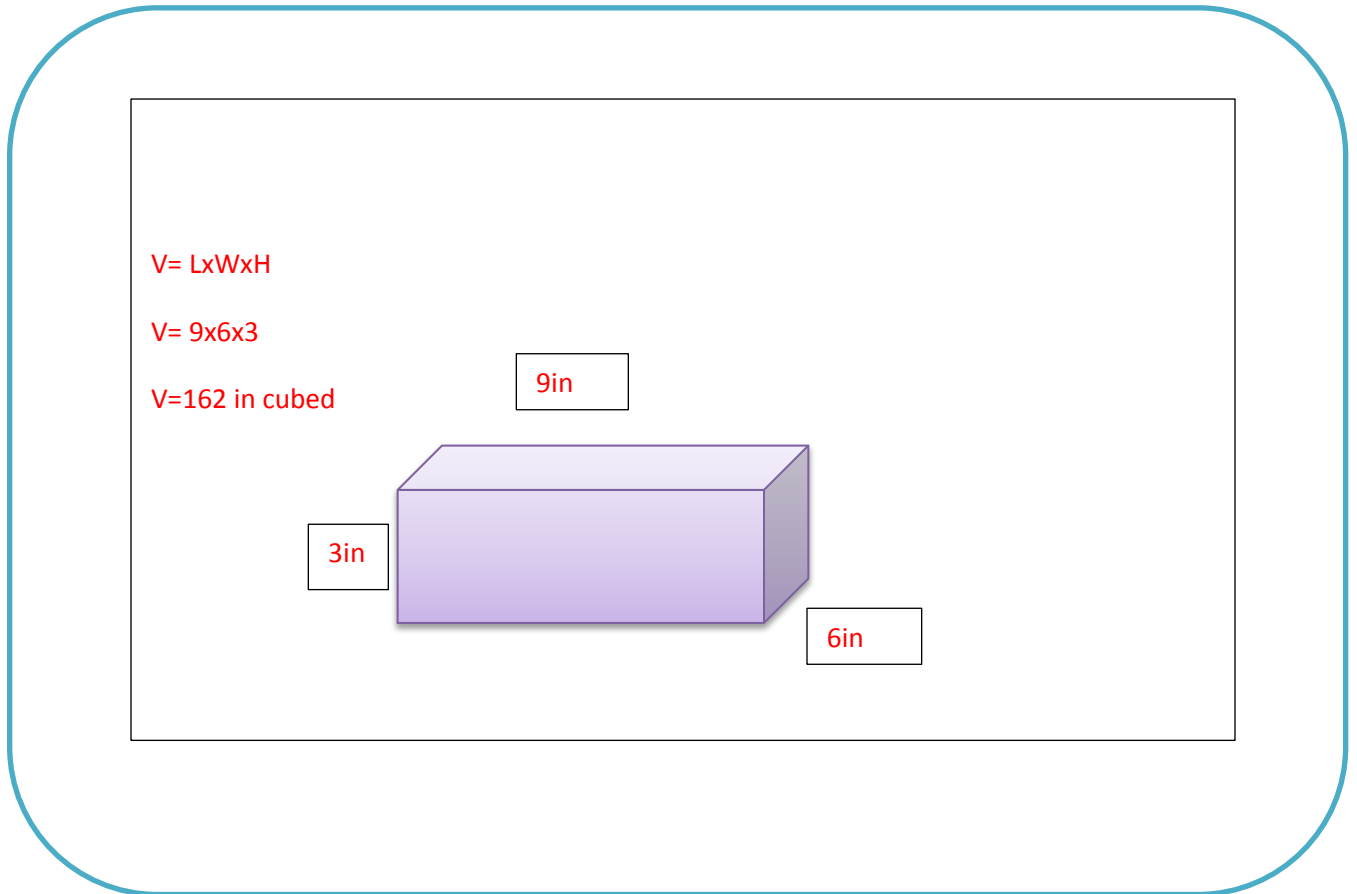
- be a rectangular prism;
- provide each cupcake with the same dimensions of space as an individual cupcake box provides; and
- measure 3 inches in height

Describe, in words, all the 6-pack box designs that will fit these conditions.

(there should be several options)

New Cupcake Box Design:

Create a model of your cupcake box. Draw the net onto the graph paper and cut it out to turn in. Draw a draft of your design below.



Describe in words all the possible designs that fit the criteria for the new cupcake box.

