

## **Title: Starburst Storage**

### **Brief Overview:**

Students will use linker cubes to create models of boxes that will be used to ship 32 Starburst candies. From this, they will decide which box is best and they will then construct this box using inch square paper. They will use skills involving volume, reasoning, measurement, and problem solving.

### **Links to NCTM 2000 Standards:**

- **Standard 3: Geometry and Spatial Sense**

Mathematics instructional programs should include attention to geometry and spatial sense so that all students analyze characteristics and properties of two- and three-dimensional geometric objects; and use visualization and spatial reasoning to solve problems both within and outside of mathematics.

- **Standard 4: Measurement**

Mathematics instructional programs should include attention to measurement so that all students understand attributes, units, and systems of measurement; and apply a variety of techniques, tools, and formulas for determining measurements.

- **Standard 6: Problem Solving**

Mathematics instructional programs should focus on solving problems as part of understanding mathematics so that all students build new mathematical knowledge through work with problems; develop a disposition to formulate, represent, abstract, and generalize in situations within and outside mathematics; apply a wide variety of strategies to solve problems and adapt the strategies to new situations; and monitor and reflect on their mathematical thinking in solving problems.

- **Standard 7: Reasoning and Proof**

Mathematics instructional programs should focus on learning to reason and construct proofs as part of understanding mathematics so that all students recognize reasoning and proof as essential and powerful parts of mathematics; make and investigate mathematical conjectures; develop and evaluate mathematical arguments and proofs; and select and use various types of reasoning and methods of proof as appropriate.

- **Standard 8: Communication**

Mathematics instructional programs should use communication to foster an understanding of mathematics so that all students organize and consolidate their mathematical thinking to communicate with others; express mathematical ideas coherently and clearly to peer, teachers, and others; extend their mathematical knowledge by considering the thinking and strategies of others; and use the language of mathematics as a precise means of mathematical expression.

- **Standard 9: Connections**

Mathematics instructional programs should emphasize connections to foster an understanding of mathematics so that all students recognize and use connections among different mathematical ideas; understand how mathematical ideas build on one another to produce a coherent whole; and recognize, use, and learn about mathematics in contexts outside of mathematics.

- **Standard 10: Representation**

Mathematics instructional programs should emphasize mathematical representations to foster an understanding of mathematics so that all students create and use representations to organize, record, and communicate mathematical ideas; develop a repertoire of mathematical representations that can be used purposefully, flexibly, and appropriately; and use representations to model and interpret physical, social, and mathematical phenomena.

**Links to National Science Education Standards:**

- **Unifying Concepts and Processes**

Students will construct models and explain concepts based on their evidence from observations; and will use measurement.

- **Physical Science**

Students will explore the properties of objects and materials; and will manipulate and position objects.

**Grade/Level:**

Grades 4 - 5

**Duration/Length:**

This performance task will take 3-4, 60 minute class periods.

**Prerequisite Knowledge:**

Students should have working knowledge of the following skills:

- Measurement
- Volume
- Area
- Estimating
- Calculating

## **Student Outcomes:**

Students will:

- work cooperatively in groups to accomplish a common goal.
- use three dimensional geometric manipulatives to model the concept of volume.
- ☐compare sizes of different boxes to make a decision.
- ☐explain reasoning behind the decisions they make.
- ☐see a relationship between the dimensions of the boxes and the 32 Starburst candies.
- ☐write to persuade by completing a business letter.

## **Materials/Resources/Printed Materials:**

- ☐32 Starburst candies per group
- ☐Linker cubes (prepared in baggies of at least 80 cubes for each group of 4 students)
- ☐Sheets of inch square paper (at least one sheet per group, extras may be needed to allow for error, Student Resource One)
- ☐Scissors
- ☐Rulers
- ☐Clear tape
- ☐Student activity packet
- ☐Teacher Resource One (Answer Key)

## **Development/Procedures:**

### **Engagement Activity**

The Starburst Corporation has decided to change their packaging of candy from bags to sturdy boxes. They will be putting their candy in containers that hold exactly 32 pieces. A contest is being held to create a design of a box that is durable and uses the least amount of cardboard possible. The winner of this contest will receive a year's supply of Starburst candies. Our school has decided to participate in this contest. Each of you will be involved in creating a box that you feel is the most suitable for shipping 32 Starburst candies.

### **Lesson Development**

Divide students into groups of four and make all of their materials easily accessible.

Have students compare the size of a Starburst to the size of one linker cube. Students should be able to observe that one linker cube is equal to two Starburst candies. Based on this observation, have students calculate how many linker cubes will be needed to create a box which will hold 32 Starburst candies. Allow students time to create as many different types of boxes using the linker cubes. Students should realize 16 linker cubes will be needed.

After several different models have been completed, instruct groups of students to choose the box that they feel is the best for packaging the Starburst candies based on the criteria of the contest. Once students have chosen one box for their group, ask them how they could build a model of this box out of inch square paper. Allow students time to discuss and share ideas.

The students will test their design by making models out of inch square paper (Student Resource One). See Teacher Resource One for best box design. Students can actually place the Starburst candies in the box as they are constructing it.

Finally, the students will write a business letter to the Starburst Corporation persuading them to choose their box for packaging. The students must explain why their design should win. Teacher may use Starburst Storage Rubric for final assessment.

### **Assessment Activities**

All of the student activities above may be used for assessment.

### **Performance Assessment:**

Students can be evaluated based on the following:

- Participation and performance in groups
- Appropriate use of mathematical language throughout the unit
- Written explanation in student activity packet
- Student created boxes
- Written business persuasion letter

A scoring rubric is included in the student packet.

### **Extension/Follow Up:**

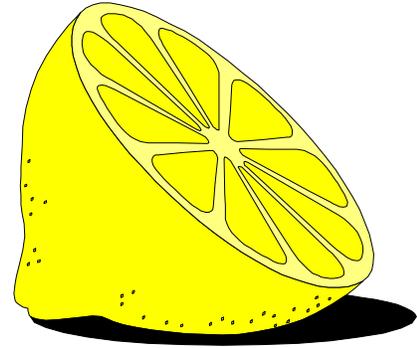
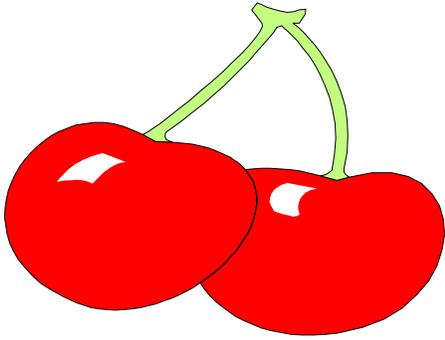
- Have students research information about the Starburst corporation on the Internet.
- Use Starburst candies in a probability activity (sort by color, flavor, graph, etc.).
- Create an ad for their Starburst storage box and candy. Students can create a web page to advertise their creation.
- Design a box to hold 42 Starburst candies.
- Create different shaped containers using pattern blocks.
- Create a circle graph using the colors of Starburst in a bag. Students can use a compass to create their circle graph. Find fractions, decimals, and percentages of the different colors on the circle graph.
- Find the mean, median, and mode of the different color Starburst in a bag.
- Have students create their own Starburst flavor, name it, create an ad, and market it.

- Students can be told that their parents will no longer allow them to eat Starburst candy unless they can persuade them otherwise. Have students write to persuade in letter format.
- Design a machine that will construct their boxes. For example, students can create an assembly line.

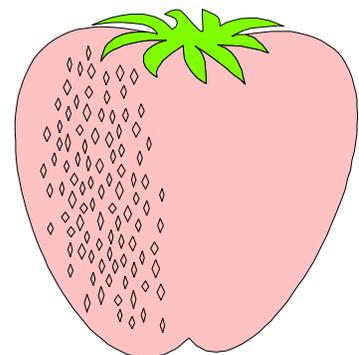
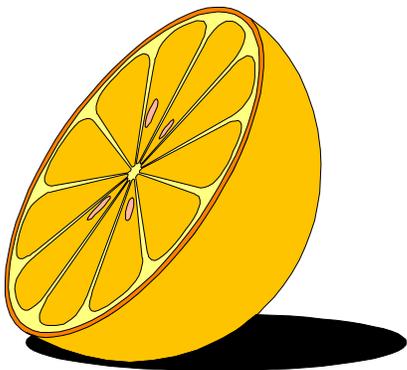
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STARBURST  
STORAGE  
STUDENT  
ACTIVITY  
BOOK



Name: \_\_\_\_\_

Date: \_\_\_\_\_

Starburst Storage

Activity I: Examine one Starburst candy and one linker cube. Compare the two sizes and decide how many Starburst candies equal one linker cube.

My answer: \_\_\_\_\_

My reason for my answer \_\_\_\_\_

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Activity II: Based on your conclusion in activity one, decide how many linker cubes will be needed to create a box that will hold 32 Starburst candies.

My answer: \_\_\_\_\_

My reason for my answer: \_\_\_\_\_

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Activity III: Using your information from activity two, create different types of boxes out of the linking cubes that will hold the 32 Starburst candies. Sketch your box creations below or on a separate sheet of paper.

Activity IV: Choose the box that you feel is the best for packaging the Starburst candies. Circle your sketch of it in activity three and explain on the lines below why you chose this box.

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Activity V: On the lines below, explain how you could build a model of this box out of inch square paper.

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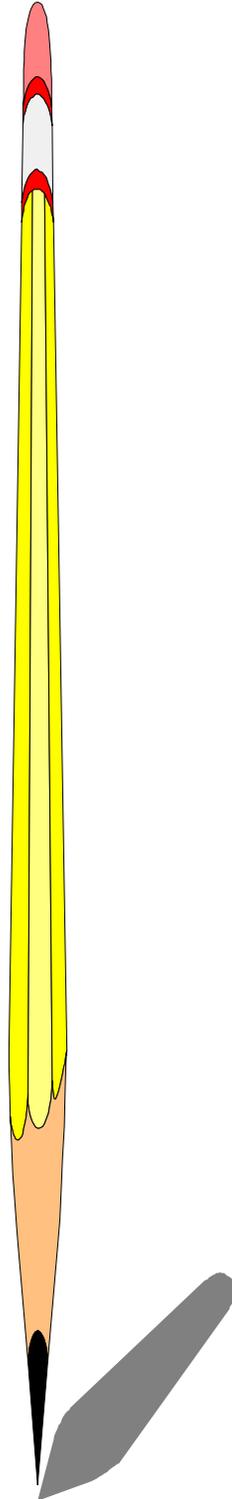
Activity VI: Use the inch square paper to make a model of your design. You may cut, tape, or tuck in any way you see fit to construct your model of your box. Remember, you are constructing your box to model your design. It must be the same shape and size!!!

Activity VII: You are certain that your box design is the absolute best. However, there are several other participants who believe their box design is the best. The Starburst Corporation is allowing you to send in a letter with your box in order to persuade them that your box should win. Write a business letter to the Starburst Corporation persuading them to choose your box for packaging. In your business letter, be sure to include three supporting details. Think about the following questions. Does your box use the least amount of cardboard possible? Is your box durable? What makes you certain that your box should win? Also remember to include a topic sentence as well as a concluding sentence.



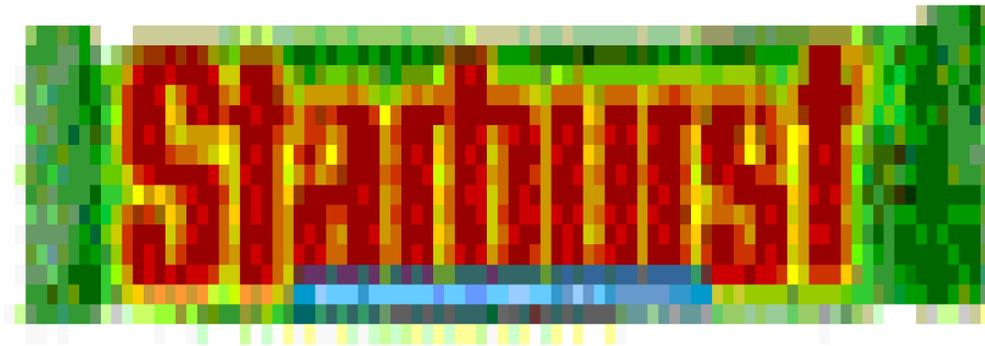
### Checklist for Business Letter

1. \_\_\_\_ Uses correct business letter format.
2. \_\_\_\_ Uses correct audience.
3. \_\_\_\_ Explains why your box design uses the least amount of cardboard.
4. \_\_\_\_ Explains why your box design is the most durable.
5. \_\_\_\_ Explains why your box should win.
6. \_\_\_\_ Uses a topic sentence.
7. \_\_\_\_ Uses a concluding sentence.
8. \_\_\_\_ Uses correct capitalization.
9. \_\_\_\_ Uses correct word usage and spelling.
10. \_\_\_\_ Uses correct punctuation.



### **Starburst Storage Rubric**

- 3 Student created a box that held 32 Starburst candies.  
Student clearly explains reasoning for building the box they chose.  
Box design utilizes the smallest surface area possible.
- 2 Student created a box that held 32 Starburst candies.  
Student partially explains reasoning for building the box they chose.  
Box design did not utilize the smallest surface area possible.
- 1 Student did attempt to construct a box.
- 0 Student did not complete activity.





# Teacher Resource One

## Answer Key

Name \_\_\_\_\_

* Solid Blocks represent formation of box				
* Diagonal Blocks can be used for flaps of box				