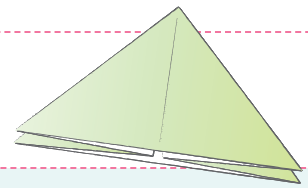


LESSON 5: WATERBOMB BASE



Activities

Activity 1: Fold the Waterbomb Base

Activity 2: Fold a Waterbomb

Activity 3: Fold a Blow Up Bunny

Models for this lesson:

Waterbomb Base, Waterbomb, and Blow Up Bunny

Materials needed:

Square Paper

Targeted grade levels:

Grades: 4,5,6,7

Math Concepts:

Square, area, bisect, intersection

NCTM Standards:

1. Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers and use models, benchmarks, and equivalent forms to judge the size of fractions;
2. Investigate, describe, and reason about the results of subdividing, combining, and transforming shapes;
3. Explore congruence and similarity;
4. Make and test conjectures about geometric properties and relationships and develop logical arguments to justify conclusions.

Math Vocabulary:

Similar, congruent, symmetry, diagonal, intersect

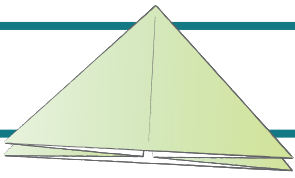
Teaching Tips and Techniques:

- Define the origami term before you make the fold.
- Use descriptive language that is appropriate for the age of the student.
- Take cues from your students - are you proceeding too quickly or too slowly.
- Introduce models that will challenge but not frustrate the students.
- Have students who are more advanced folders act as your assistants, have them help other students with the folding.

Lesson Introduction

The Waterbomb Base derives its name from the Japanese “waterbomb” which, when folded, can be blown up or filled with water and used for play. The folding sequence of the Waterbomb is somewhat similar to the Preliminary Base from Lesson 4. However, the order of the folds is different so the collapse yields a triangular shape as opposed to the square shape of the Preliminary Base. They are identical in terms of the number of flaps or layers. In fact, if you turn a Preliminary Base inside out, you will have a Waterbomb Base.

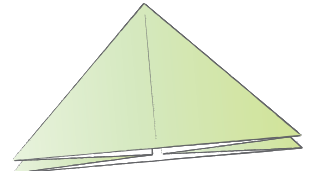
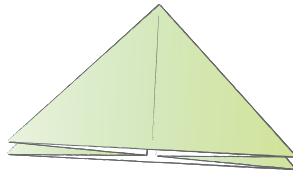




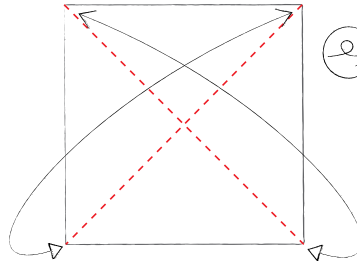
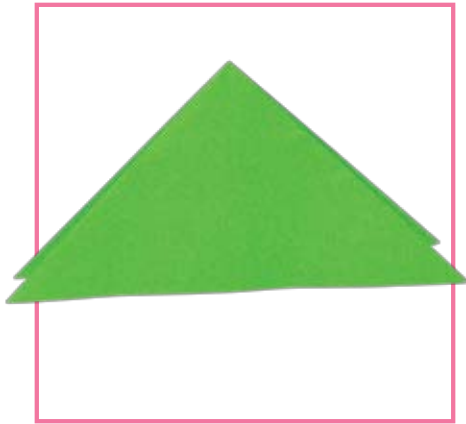
ACTIVITY 1 - *Fold a Waterbomb Base*

Neatness and precision really pay off in the Waterbomb Base. The collapse is easiest when all the creases pass through the same point of intersection, thereby providing a precise Waterbomb Base to make the models.

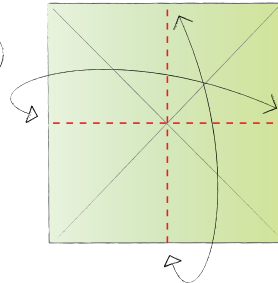
1. If the length of the square is A, what is the area and perimeter of the squares produced by the Book Folds. What is the length of the Book creases?
2. When making the diagonals, try to make all the creases go through the same point. This greatly helps with the collapse.
3. Do you see the similarity between the Waterbomb and Preliminary Bases? The creases are same but reversed in the Waterbomb Base (compared to Preliminary Base).
4. The Waterbomb Base has 4 triangular flaps, 2 on each side.



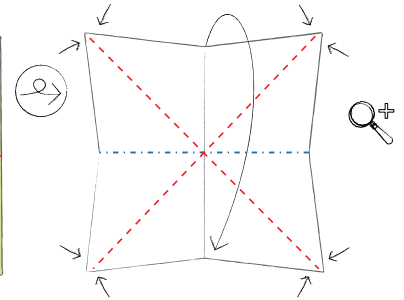
WATERBOMB BASE *Traditional*



1 Start with white side of paper facing up. Fold in half diagonally in both directions. Unfold and turn over.

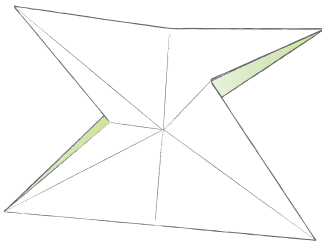


2 Fold in half in both directions. Unfold and turn over.

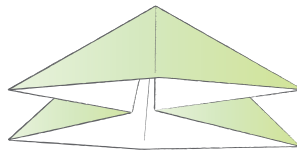


3 a Pinch the corners and collapse using existing creases.

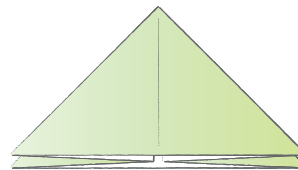
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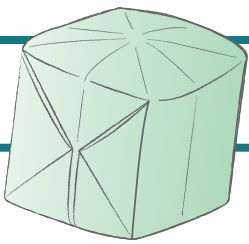
3b Collapse in progress.



3c Collapse in progress.

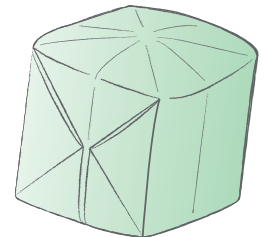
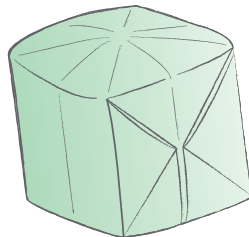


Finished Waterbomb Base!

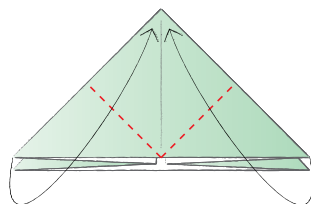


ACTIVITY 2 - *Fold a Waterbomb*

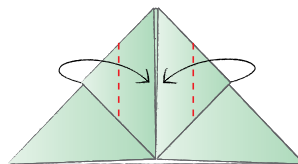
1. Although sharp precise creasing generally leads to a better result, there is a danger of layers overlapping in this model. Therefore, when bringing the corners of the Waterbomb up in step 1, be sure to leave a little gap (engineers and artists refer to this as a 'fudge' factor) in the middle.
2. Write a message in the center of the paper. When you inflate the waterbomb try locating the message by holding it against a light.
3. How does this whole structure hold up and stay inflated?
4. Explore different sized Waterbombs with different paper sizes. See the surface area and volume of the cubes. You can calculate the volume by filling it with water and measuring the volume of water. Surface area can be calculated by marking the visible area and then adding up the area of squares and triangles. Do you see a correlation?



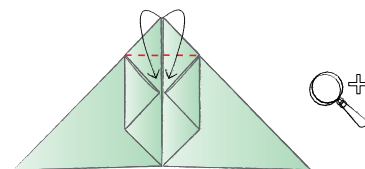
WATERBOMB *Traditional*



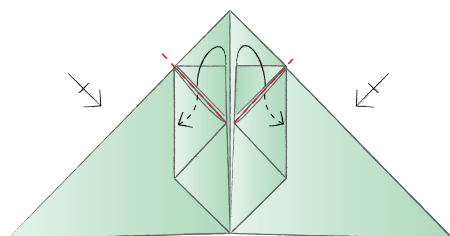
1 Start with the Waterbomb Base. On the front layer, fold bottom points up to top.



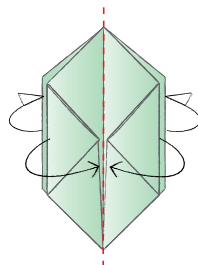
2 Fold side corners in to center.



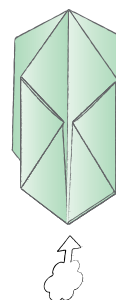
3 Fold top loose corners down as shown.



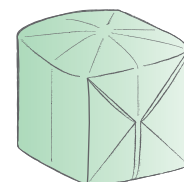
4 Fold triangle tabs down and insert into the pockets below to lock the paper inside. Repeat steps 1-4 on other side. Note: this will lock the paper so it won't open up when you blow the Waterbomb.



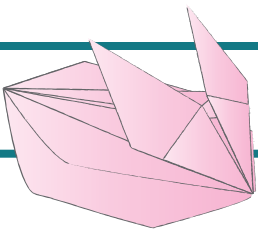
5 Arrange flaps so they are separated in 4 directions.



6 Hold gently not pinching the locks and blow into the opening at the bottom. Note: hold the model loosely by the folded edges so you don't prevent it from inflating when you blow.

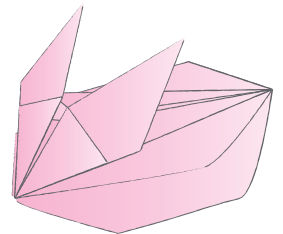
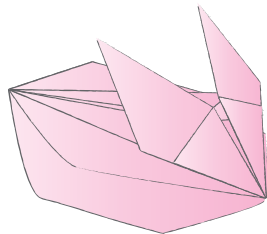


Finished Waterbomb!



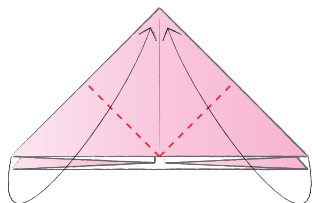
ACTIVITY 3 - *Fold a Blow Up Bunny*

1. If you have trouble inflating the Bunny, try clapping the ears together and hold by their tips very loosely as you blow.
2. Does the message show up in the Bunny? You can use this model as a nice decoration for festive occasions such as Chinese New Year, spring festivals, and Easter.

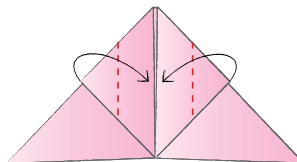


BLOW UP BUNNY

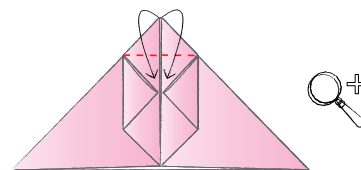
Traditional



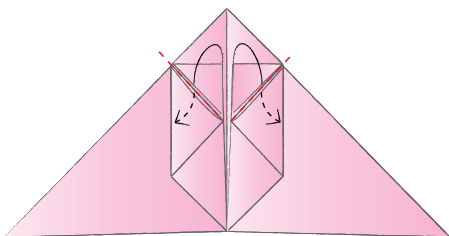
1 Start with the Waterbomb Base. On the front layer, fold bottom points up to top.



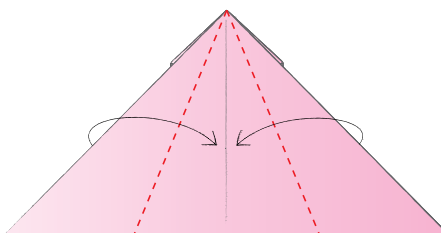
2 Fold side corners into center.



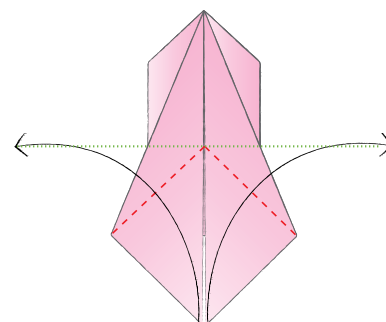
3 Fold top loose corners down as shown.



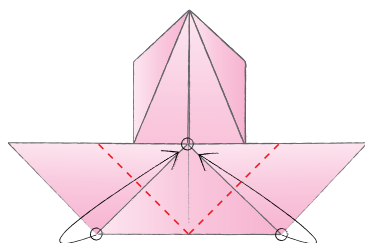
4 Fold triangle tabs down and insert into the pockets below to lock the paper inside. Turn over to other side. Note: this will lock the paper so it won't open up when you blow up the bunny.



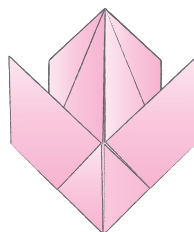
5 Fold side edges to center as shown.



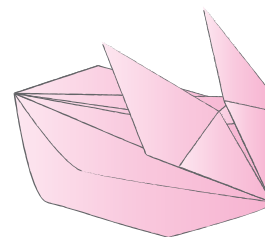
6 Fold up the corners so they are perpendicular to the center line.



7 Fold the ears up by bringing the bottom corners to the center as shown.



8 Pinch the ears at the base and hold together while blowing into the opening at the nose.



Finished Blow Up Bunny!