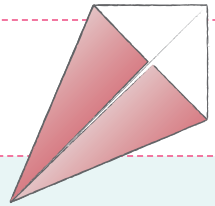
LESSON 1: KITE BASE



Activities

***Activity 1*:** Make a square from a rectangle

***Activity 2*:** Fold a Kite Base

***Activity 3*:** Simple Traditional Whale

***Activity 4*:** Traditional Swan

Models for this lesson:

Kite Base (also called the Ice Cream Cone Base), Traditional Simple Whale, and Traditional Swan

Materials needed:

letter sized paper (8 ½ x 11), scissors, square origami paper

Targeted grade levels:

Kindergarten, 1st, 2nd, 3rd (additional tips for older students)

Math Concepts:

shape, symmetry, fractions, division, numbers

NCTM Standards:

1. recognize, name, build, draw, compare and sort two- and three-dimensional shapes;
2. describe attributes and the parts of two- and three-dimensional shapes;
3. investigate and predict the results of putting together and taking apart two- and three-dimensional shapes, understand how to measure using nonstandard and standard units;
4. understand how to measure using nonstandard and standard units.

Math Vocabulary:

rectangle, square, triangle, diagonal, angle, right angle, bisect

Teaching Tips and Techniques:

- Become familiar with origami terminology and basic symbols as these will be used over and over in each new model.
- Try folding the model several times before the lesson. You should be familiar with all the steps before teaching others.
- Show the students a completed model so they know what they will be making.
- Anticipate where students might have a problem.
- Use oversized paper when you are teaching - it will be easier for students to see the folds you are making.

ACTIVITY 1 - *Make a square from a rectangle*

Reference illustration in diagrams to the right.

1. What shape are we starting with? Hold up different sized papers and ask if they are all rectangles. How do you think the size of the rectangle affects the size of the square we are making? Which side of the rectangle is longer?

Take left short side of the paper and lay it on the top long side and crease sharply - what shape have you made?

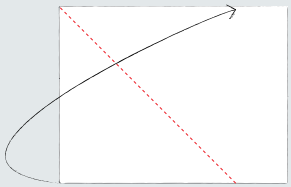
2. What shape is left over? Cut this rectangle off. Does this small rectangle share an attribute with the original rectangle? What shape do you have now?

3. Open the paper. What shape do you have now? What shapes do you see in the square?

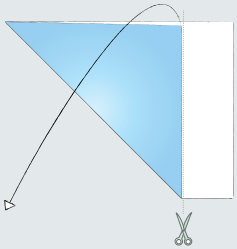
Experiment with rectangles of differing dimensions to see how the widths of the strips vary. Use the rectangular strips to make more squares. With older students you can discuss area measurements. Does the area of the original rectangle equal the sum of the area of the square and the area of the small rectangle cut off in Step 2?

How to make a square from any rectangle

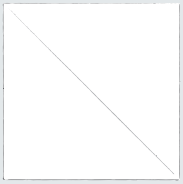
Most origami begins with a square sheet of paper. You can make it yourself from any rectangle. Look around for copy paper, magazines, advertisements, gift wrap, stationery or any other paper you have in the house. Then follow the diagrams to make your square.



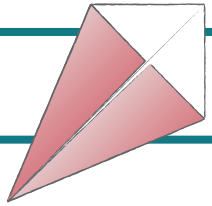
1. Place the rectangle sideways the long way. Valley fold the left-hand side up to meet the top, thereby making a triangle.



2. Cut the extra strip off along the side of the triangle.



3. Open out the triangle into the square.



ACTIVITY 2 - *Fold a Kite Base*

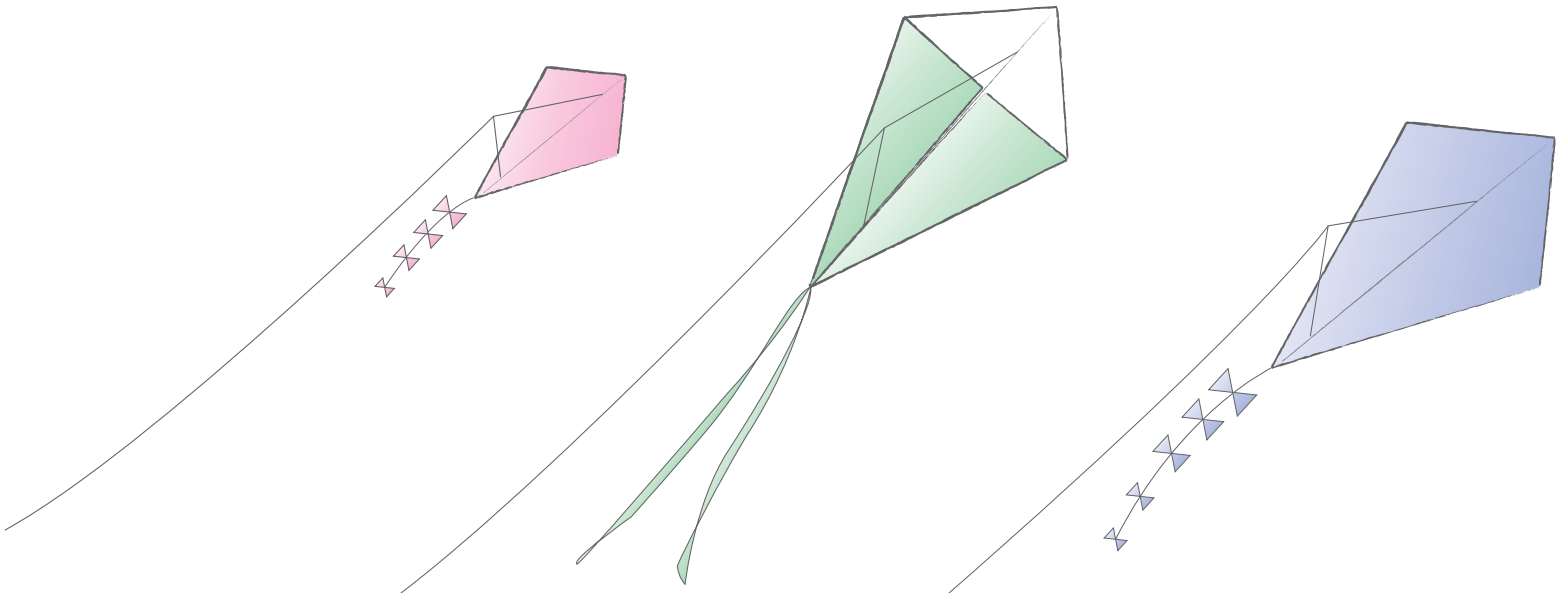
1. Have students orient the paper with a corner of the paper pointing towards them. The paper is square but does it remind them of another shape. Remind students to line the points up at the bottom and on the sides before making a crease. What shape have we made with this crease? How many triangles did we create in the square?

2. Here we bisect the angle. Are the two triangles the same size? As you turn the model over and repeat the fold on the other side, discuss the fact that often origami is symmetrical - the crease made on one side is repeated on the other. What does that mean? Which triangles are the same? What else do you see that is symmetrical (maybe the eyes or ears on a person's face or the classroom windows)?

3. Remind the students to open the model so they see both colors of the paper. What shape is this? Remind the students that this is called the Kite Base and is also known as the Ice Cream Cone Base. How many triangles do you see? Are they all the same size?

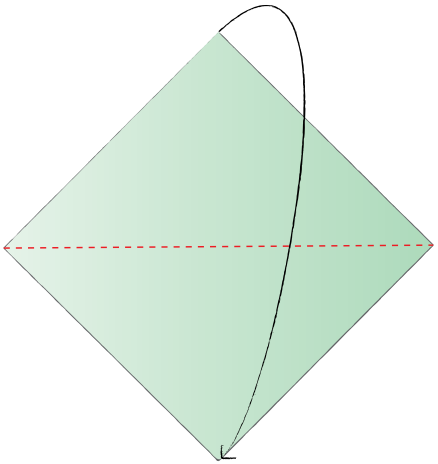
For older children, have them open the model and look at the creases they have made. What could you call those creases? They are angle bisectors. What size angle did you start with? 90 degree. What size angles do you have now? There are four 22.5° angles.

Also for older students, discuss the areas of the triangles, figure out the resulting angle when you bisect the angles in steps 1 and 2. Figure out the areas of the different triangles.

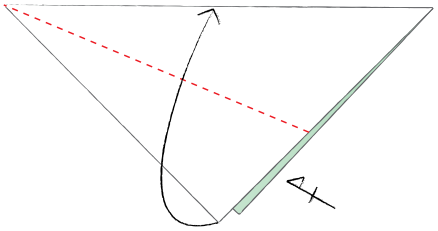


KITE BASE *Traditional*

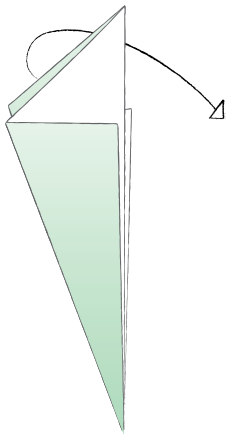
Also known as the Ice Cream Cone Base, this base is one of the most common beginings to a number of traditional models.



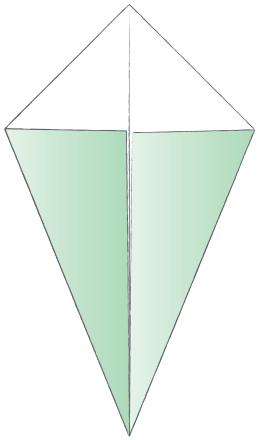
1 Start with the color side up. Fold in half by bringing the top corner to the bottom.



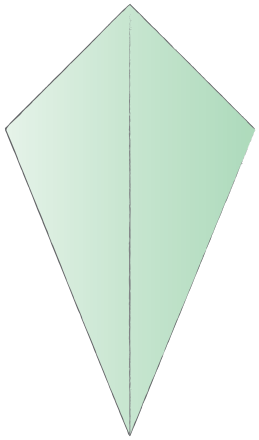
2 Fold up one layer so the bottom left side matches the top edge and makes a nice sharp point on the left side. Repeat on other side.



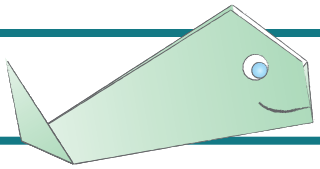
3 Open up to the Kite Base (also called the Ice Cream Cone Base).



Finished Kite Base!



The other side.



ACTIVITY 3 - *Simple Whale*

1-4. We have included the diagram steps of the Kite Base again as a reference. Start with a Kite Base with both the color and white of the paper showing. After folding the top corner, what is the resulting shape? Have the students count the number of sides. There are 5 sides, but they are not equal so it's an irregular pentagon.

5. How many sides do you count now?

6. Your finished whales! Remind the children that, just as in the open ocean, no two whales look exactly alike.

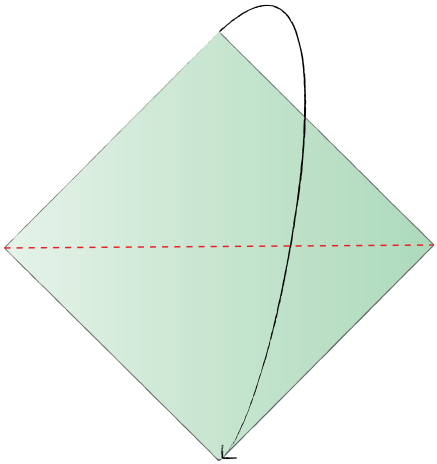
When you have finished your whales, have the children unfold (they are simple to refold) their models and look at the creases inside. How many triangles do you see? How many different shapes can you find? Can you find the little kite shape (at one corner of the paper)? You can have them mark the pairs of triangles with different colors.

You can also have students fold more models out of progressively smaller paper.

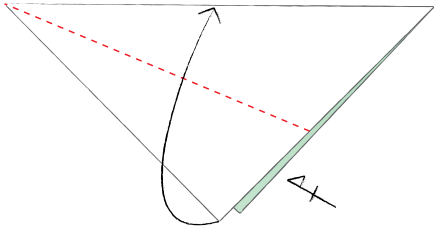
SIMPLE WHALE *Traditional*

PAPER INFO: 6-inch square paper was used to make this 5 ½-inch model.

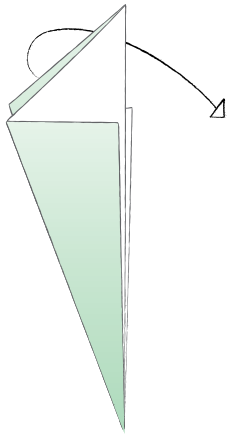
TIPS AND TRICKS: The tail can be inside reversed for more advanced folders. Have students decorate the model with eyes and mouth using markers or stickers.



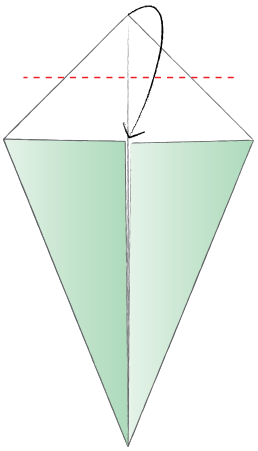
1 Start with the color side up. Fold in half by bringing the top corner to the bottom.



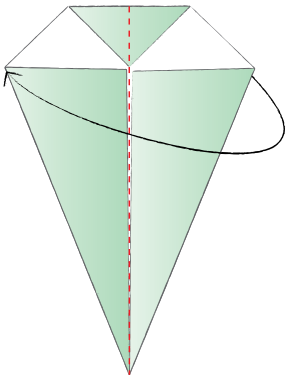
2 Fold up one layer so the bottom left side matches the top edge and makes a nice sharp point on the left side. Repeat on other side.



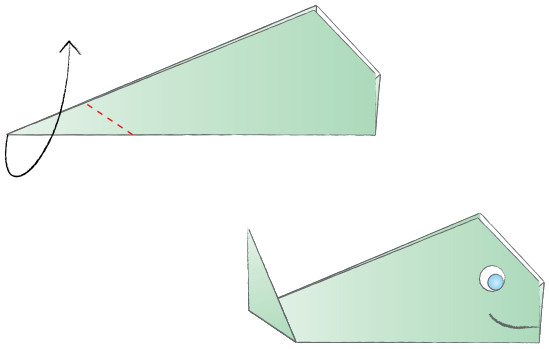
3 Open up to the Kite Base (also called the Ice Cream Cone Base).



4 On the top white triangle, fold down corner to other points.

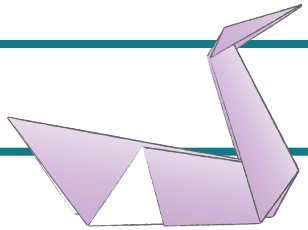


5 Fold in half the long way.



6 Fold back point at an angle to create the tail.

Finished Traditional Whale!



ACTIVITY 4 - *Traditional Swan*

1. Remind students you've made this base before when you folded your whales. What shape do we have? Do you remember the name of the base? Either Kite Base or Ice Cream Cone Base is a correct answer.

2. Here we're making the swan's beak so we want it pointy. Have the students identify the center crease - what does center indicate? Start the fold at the tip and roll the edge to the centerline. We are bisecting - or cutting in half - this angle. (For older students you can have them unfold the model to examine the angles. What size is the angle made in this fold? In the previous fold?)

3. What shape have we made now? How many sides can you count?

4. Discuss fractions. Is 1/3 larger or smaller than 1/2?

5 - 7. At this point it is easier for some to hold the model flat on a hard surface with one hand and pull up the neck with the other. The same is true for the head.

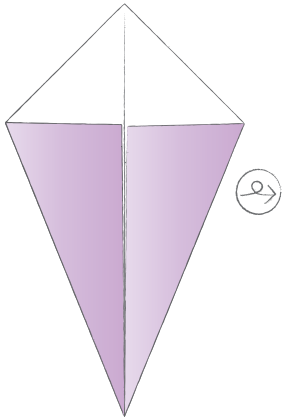
For Older Students

- Discuss where other examples of paper that can be used for folding might be found around the house.
- Discuss concepts of habitats, ecology, and conservation for the animal just folded.
- Fold another model and open up to examine the creases. Color shapes that are similar.
- Discuss symmetry and then have students figure out what the next fold is after you show them a step.

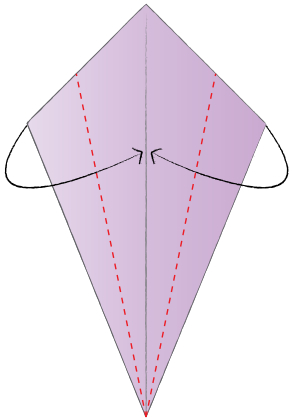
SWAN *Traditional*

PAPER INFO: 6-inch square paper was used to make this 4¼-inch long model.

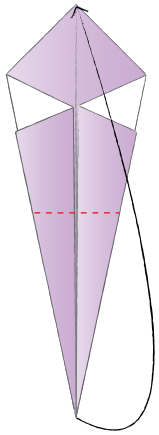
TIPS AND TRICKS: To make a nice sharp point, start folding from the tip when bringing sides into center. If the swan is unbalanced and falls forward, adjust the angle of the neck and open up the body from the bottom.



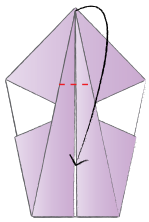
1 Start with a Kite Base; turn over.



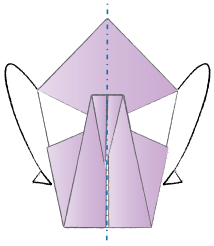
2 Fold long sides into center.



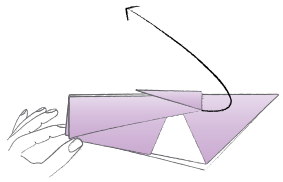
3 Fold in half, bottom point to top.



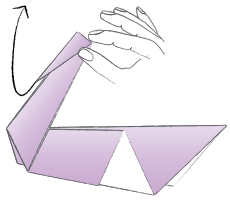
4 Fold tip back down about one third.



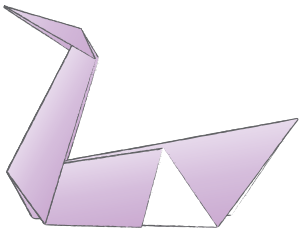
5 Mountain fold entire model in half the long way.



6 Pull up neck at a slight angle; pinch lower part to make it stay.



7 Pull head up and pinch the base to make it stay.



Finished Traditional Swan!