

Chicks in Space: Facilitator Directions



Big Idea: I can measure the amount of space in a box.

Summary: This activity is designed to introduce young children to the geometric idea of “area” in a concrete, tangible way using a nonstandard measurement called a “Chickspace”.

Group size: 2-3

Materials

1. Square Chickspaces (at least 10 per group plus some extras, depending on the size of your boxes)
2. Rectangular Chickspaces (at least 4 per group plus some extras, depending on the size of your boxes)
3. Yardsticks, 1 per group
4. Multiple medium to large boxes or plastic containers, at least one per group with extras so that there are always a couple available

Setting Up

Since youth will be physically manipulating the Chickspaces rather than calculating square footage, Chickspaces come in two shapes: rectangular and square. Square Chickspaces measure 8.5 inches per side, while rectangular Chickspaces measure 6 inches by 12 inches.

You will need to cut the Chickspaces ahead of time. You can make them using cardstock, recycled paperboard from cereal boxes, or another stiff material so that they will last over several uses. You may want to place the Chickspaces into two bins that are accessible during the activity rather than passing out a designated number of Chickspaces to each group. This can provide youth with more opportunities to think about the mathematics of space-filling for each box.

Label each of the boxes (e.g., Box A, Box B, etc.) with a permanent marker. Make the labels large and easy to read. If you are working with youth who are still learning how to use a ruler, you can also add the box dimensions to the label. Youth can use the label to check that they are measuring correctly.

Introduction

Newly hatched chicks need space to run around so they can grow healthy and strong. An incubator does not give chicks enough space to move. They can run into eggs that have not yet hatched. They can get run over by larger chicks. Once they have hatched, chicks need to move out of the incubator into a brooder box.

From hatching to 4 weeks old, each chick should have at least 0.5 ft². Chicks will need 1 ft² from ages 4 to 8 weeks old. Space requirements for fully-grown chickens vary depending on the chicken’s age and breed.

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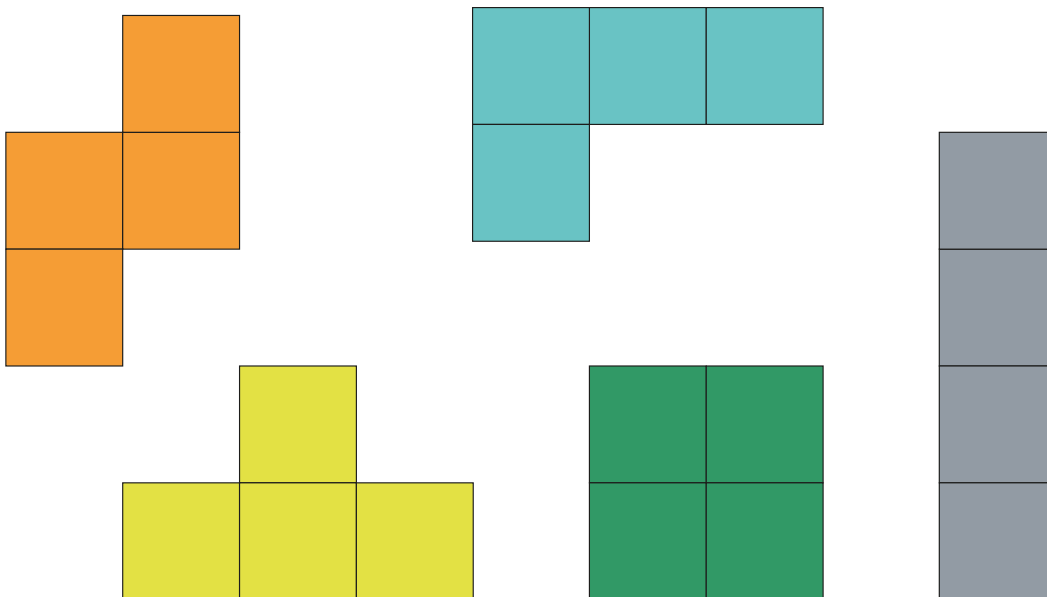
Activity:

Ask youth to gather closely together if safety permits, or else show them a picture of a large crowd of children tightly gathered together. Ask them whether it would be safe to play a game like soccer when people are close together. Have youth brainstorm some reasons why space is important for growing bodies.

Explain that space is important for baby chicks to grow properly and safely. Incubators do not provide baby chicks with safe spaces to move and play, so farmers move the hatched chicks into homes called brooder boxes. It is very important for a farmer to make sure that the brooder box has enough room for all of the chicks.

Poultry experts recommend that each baby chick has $\frac{1}{2}$ square foot of space in a brooder box. If you are in a space with 12"x12" tiles, you can use those as a reference point: each tile can hold two chicks comfortably.

Show the cut out Chickspaces to youth. Explain that one Chickspace is equal to the right amount of space for a newly hatched chick (0.5 ft^2), no matter the shape. Youth may be confused and think that the different shapes are different "sizes". If you are in a space with a tiled floor, you can demonstrate how different shapes can share the same area by having youth pretend that they are chicks who need four tiles of space. The only rule is that a tile must share at least one side with another tile ("corners only" does not count). Give youth until the count of ten to claim their "space". While some youth may end up claiming squares or rectangles, others may even end up in non-rectangular tetromino shapes. Point out how all of the shapes have the same amount of space, even though they look different.



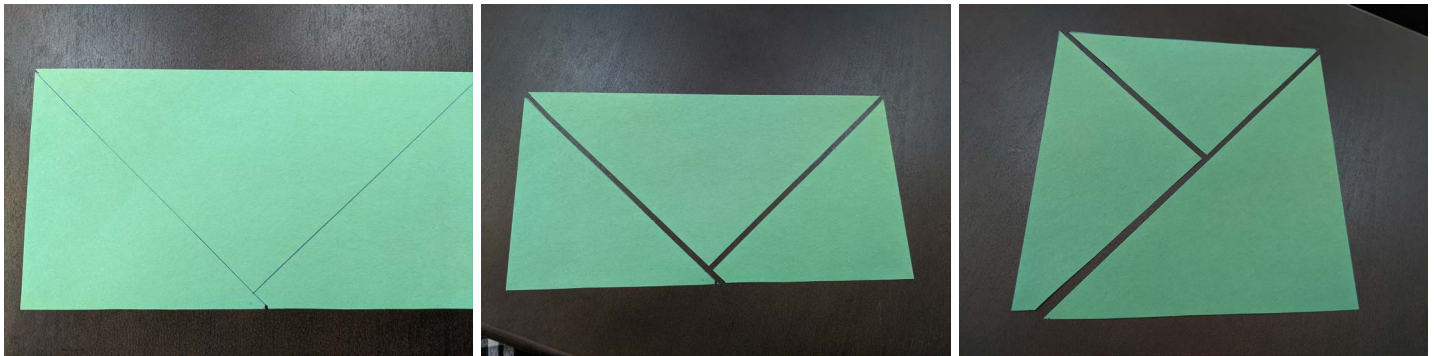
Tetramino Shapes

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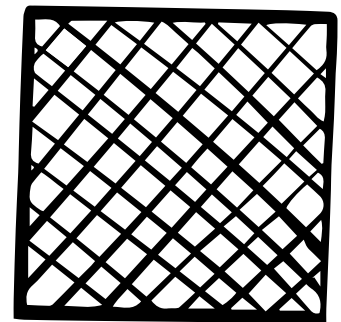
To visualize how a square and a rectangle can actually have equivalent areas, you can check out this interactive: <https://nrich.maths.org/823>.

Another option is to use the Chickspace Demo template. The Demo template starts as a rectangular Chickspace. Cut along the dotted lines to create three slices. The slices can be rearranged to make a square Chickspace. You can choose to do this as a demonstration or give pairs their own templates to play with. To learn more about the math behind this transformation, visit <http://sofia.nmsu.edu/~breakingaway/Lessons/R2S/R2S.html>.



Using a small box such as a clear, plastic shoebox, demonstrate how to use the Chickspaces to measure the area of the floor. A clear box is useful for this demonstration because you can point out how the Chickspaces need to lay flat on the ground without overlapping or wrinkling up. You can also show how you can combine Chickspace shapes to try to fill as much space as possible. Remind youth that each Chickspace represents one chick.

Model filling in the table with the example box. Draw a sketch of the box and how it was filled. Use “S” to mark square Chickspaces, “R” to mark rectangular Chickspaces, and **cross-hatching** to mark blank areas not covered by a Chickspace to help youth connect the sketch to the actual layout. Count the total number of Chickspaces that fit in the example box and write that number in the space labeled “Total Chickspace”. It is not necessary to convert Chickspaces to standard measurements (i.e., inches, feet, squared feet, etc.) with young children, although you certainly may do so with older youth. Next, model how to use the yardstick to measure the length and width of the box. Add that information to the table. If you are working with older youth, you can have them multiply to find the area and compare it to their Chickspace count. You could even challenge them to find the area of any cross-hatched space left in their layout.



Cross-hatching

Have each group measure two or three boxes. It is okay if groups do not all measure the same box. As groups are working, look for discrepancies that do occur for the same box. If you do find one, use it as a way to spark a class discussion about space filling. Encourage youth to see if they can fit any more chicks into any more of the boxes.

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Another good discussion can grow out of a group that finds they would have to use more than one box to fit all of the chicks. Ask youth to determine how they would decide on the best-sized boxes to use in that case. You can also ask youth whether they would recommend two smaller boxes versus one box that is very, very large and why. Use these conversations as opportunities to highlight how farmers have to use math when they think about costs, space, supplies, etc.

At the end of the lesson, groups should write a letter to their friend who needs help setting up a brooder box for 10 chicks.

Variations:

If you are working with older youth, you can challenge them to prove why a 6 inch square is not equal to 0.5 ft^2 .

Challenge youth to figure out how many chicks could fit into their classroom space.

Using graph paper, try to find all seven possible tetromino shapes. Afterwards, cut a square Chickspace into four equal squares. Arrange the squares to make Chickspace-sized tetrominos. Trace and cut out the Chickspace tetrominos. See if you can use them to fit more chicks into one of the boxes.

Use the square Chickspaces to explore arrays up to 5×5 . See Lesson 7 for ideas.

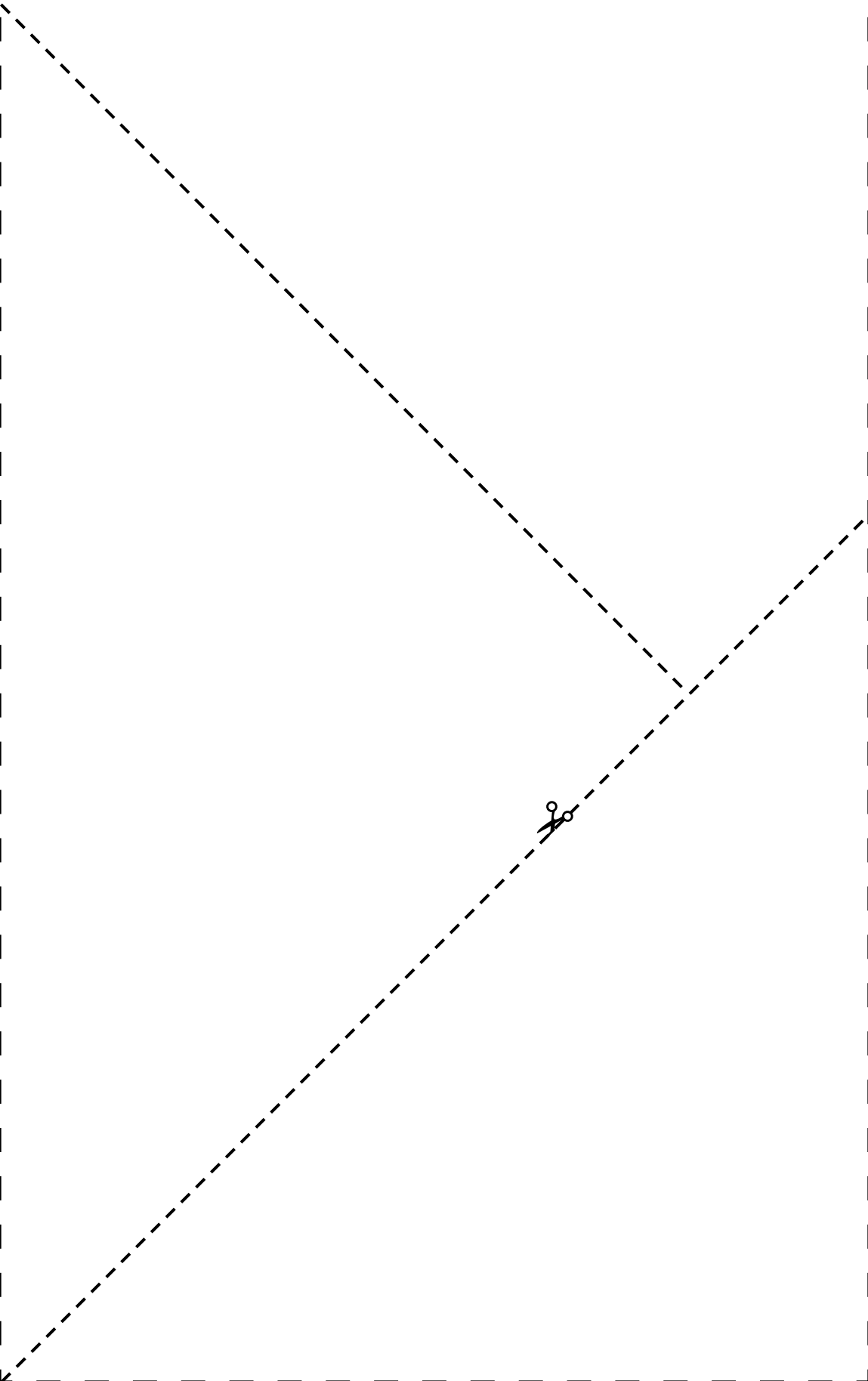


NC STATE

EXTENSION

6 inches

12 inches



12 inches

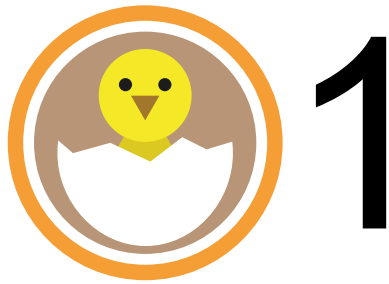
6 inches



1

Chickspace

8.5 inches (cut to the edge of the sheet)



Chickspace