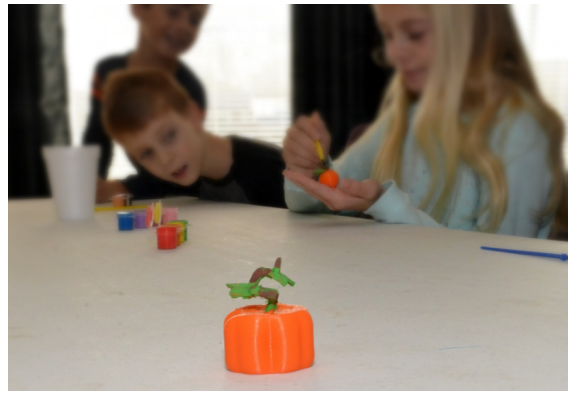
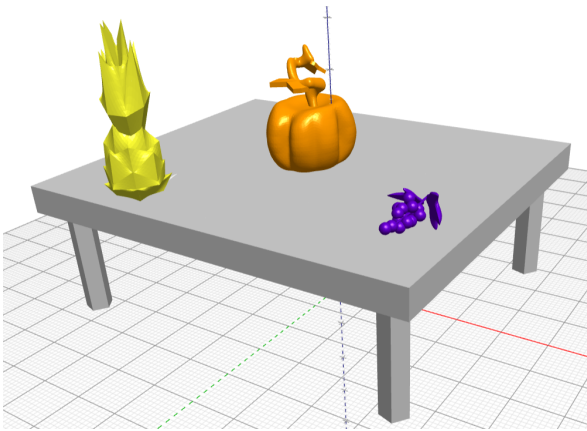


SOLIDWORKS Apps for Kids are designed to inspire students to create, invent, and shape their futures, and BlocksCAD injects coding and mathematics into this engineering process. In conjunction, educators can engage their students in all essential steps of the design process.

## Designing New Foods

with BlocksCAD and SOLIDWORKS Apps for Kids



### LESSON SUMMARY

In this activity, students will think about how scientists and farmers dream up and then breed or create new foods. They will use the SOLIDWORKS Apps for Kids to create 3D models of new foods, either completely from scratch, or by combining some of the existing food models provided as part of this exercise. Students will then use BlocksCAD to arrange their culinary creations using coding and transformations on 3D axes. Full standards alignment can be found below.

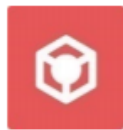


## CONSIDER THIS

Have you ever thought about how we got seedless versions of some foods, like grapes and watermelons? Modern farmers are constantly trying to produce better foods. Over the years, farmers and agricultural scientists have learned how to combine different plants so they'll have new flavors, smells, colors, and ways of being grown. This type of modern farming has created new types of beautiful and incredible-smelling flowers, new foods like cayenne pepper or broccoflower, and new foods that can be grown more easily and in more places around the world.

- What are some of your favorite fruits or vegetables and what do you like about them?
- What are some meals or dishes those foods are used to make?
- What other fruits or vegetables could be combined to make those meals better?

**TIP:** If the students are having trouble thinking of foods that could be combined, one suggestion you could ask them to consider is wheat. Since wheat flour is used to make so many foods, if other fruits or vegetables could be combined with wheat, it could lead to some very creative new meals and dishes.

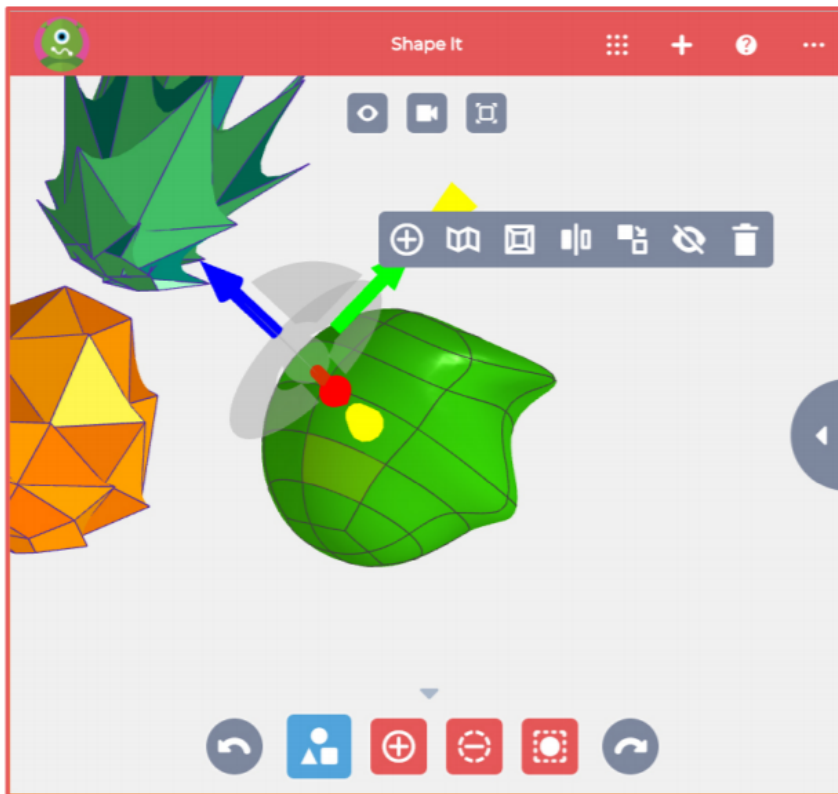


## MODELING THE NEW FOOD

Once the students have had time to consider the new foods they would like to create, have them launch SOLIDWORKS Apps for Kids Classroom. SOLIDWORKS has some video tutorials that can help students get familiar with the Shape It App's basic features. Students can watch the videos by clicking the Help icon in the main menu at the top of the App. But since the Shape It App works a lot like modeling clay, many students will be comfortable jumping right in and learning about the App as they go.

For inspiration we've created a few sample food models for this exercise. You can access the Sample Content in the Sample Lessons section of the Organization tab in your Classroom account. Share this content to your class and the students can use it as a starting point by clicking the "Riff" button on the model they like. Students can also start completely from scratch by launching the Shape It App from the plus sign in the main menu at the top of the App.

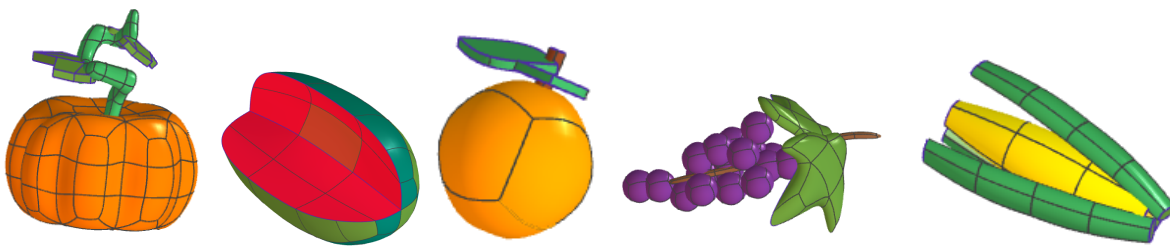
TIP: The included food models for this project may seem advanced, but they are really just combinations of basic shapes that have been pushed, stretched, or reshaped to look like the actual foods. Encourage the students to start working with their models by adding a few of the basic shapes side-by-side onto the work area, and then start clicking on the shapes to mold them into looking more like the new foods they want to create. Also encourage students not to get frustrated if their models do not look like they want immediately. 3D modeling can involve a lot of reshaping to get something exactly right, and students should be reminded that many creations may need lots of changes over time, and that this process of making changes is how ideas are improved.



The **Shape It** App works similar to modeling clay. Just click on a section of a shape and drag it somewhere to begin changing the shape. You can also click on edges and corners between sections of a shape, and then drag those as well.

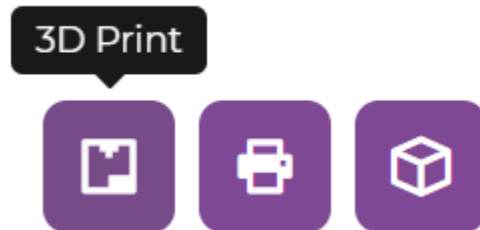
When you click on a section of a shape, a popup menu with more editing options Appears. These extra options can allow you make big changes to the shape, like add new sections, smooth or sharpen a section, or even make a duplicate of the shape in the model.

Experiment with different options to see how creative you can be with your new foods.





Once students have finished their model in the Shape It App, they should navigate to the Print It App and download the STL file of their food item to their device using the 3D print button:



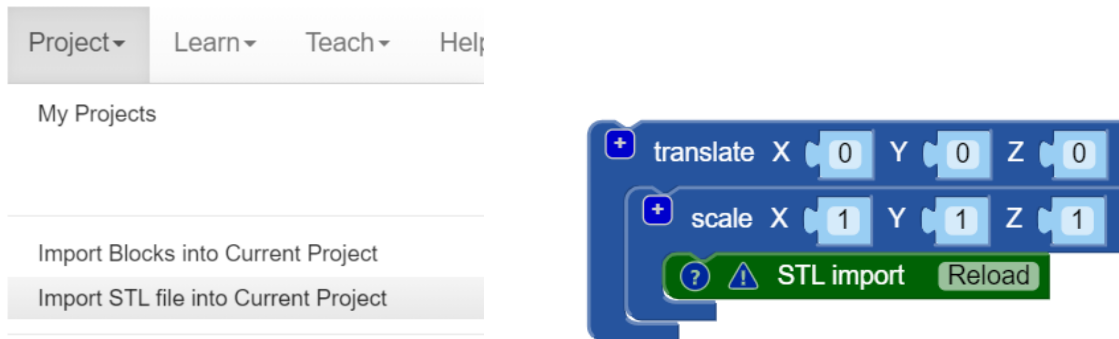
Direct students to [www.blockscad3d.com](http://www.blockscad3d.com) and help them either login using their Google accounts or with new usernames and passwords. When they login they will be guided through a brief tutorial, but you can also show essential skill videos such as [translation](#), [rotation](#), and [scaling](#). Early in the building process students may be ready to learn how to [organize and label](#) their code.

Have students build a table on which to display their new food as if they were pitching their idea to a panel of food scientists or consumers. They will primarily need to create and resize shapes from the 3D shapes menu and then translate them into place along the three axes using a blue translate block.



To import the food that they molded in the Shape It App, students can select the “Import STL file into Current Project” option from the *Project* menu at the top of their building screen. They will then need to use a scale and translate block to resize their food and position it on their table. They can copy and paste their code to quickly make several copies to orient and arrange:

**TIP:** If students reopen the project late they will need to Reload their STL file by navigating to it again wherever it is stored on their local device.



**Differentiate:** Have students who are working quickly build a sign-post and manipulate 3D text to label their culinary creation.

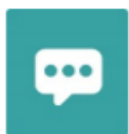




## COLLABORATION

Students can share their STL files with one another so that they can set up a display of many different types of foods. Teachers can either do this in their own BlocksCAD project, adding, scaling, and positioning each student's project onto one communal table, or students can use email or Google Drive to share their projects and import them onto their own tables!

**TIP:** If you are rendering many different STL files in the same project you can speed up rendering by changing the resolution to low in the bottom right corner of the BlocksCAD screen.



## DISCUSSING FOODS

After students have shaped and styled their models, have them consider and discuss the following questions about creating new foods:

- Think about the parts of existing foods you used to create your new foods. Why did you choose those parts to create your new foods?
- How are your new foods an improvement on existing foods?

- Try to imagine how your new foods would be grown. Would they make growing foods easier or more difficult? Why?
- How will your new foods change what people eat?
- Consider how your new foods could be used with other foods. How will your new foods affect how other foods are used?



## FOOD IN THE REAL WORLD

The videos listed below can help students explore and understand ways new plants and foods are changing our world. Read the introduction paragraph to the students, then have them view the videos for that topic. After students have viewed the videos, you can use the included questions to encourage discussion on those topics.

**Healthier Food Choices:** Have you ever thought about how the food you eat can impact your life? MyPlateMyWins is a program created by the U.S. Department of Agriculture to encourage everyone to eat healthier meals. In the following videos, you'll see examples of how small changes to a meal can have big results in healthier eating. After you watch the videos, you'll have a chance to talk about how new foods could be created that would make it easier to eat healthy. Pay attention to the ways the meals were changed.

#MyPlateMyWins at Lunch: <https://www.youtube.com/watch?v=bqAUUxXx2sQ>

#MyPlateMyWins at Dinner: <https://www.youtube.com/watch?v=ArSnyWaOAmQ>

#MyPlateMyWins at Snacks: <https://www.youtube.com/watch?v=srJXLmrrmp7s>







## EDUCATOR RUBRIC

Section	Does Not Meet Expectations	Meets Expectations	Exceeds Expectations
<b>Consider This</b>	Student does not express opinions, or could not name any fruits and vegetables.	Student is able to name some favorite fruits and vegetables, and can express how they can be used in a meal.	Student can express how fruits and vegetables are used in the creation of other components of a meal, e.g. that tomatoes are part of a sauce served with spaghetti.
<b>Modeling the New Food</b>	Student was unwilling or unable to add shapes and objects to a new model, or add or adjust objects in a riffed copy of an existing model.	Student modified an existing model or created a new one by adding or modifying shapes in the model.	Student demonstrated original creativity and/or artistic ability by making substantial modifications or new models that are associated with the goals of the lesson.
<b>Coding</b>	Student did not create a coded program to to arrange any 3D shapes.	Student used several different pieces of code to create a recognizable 3D object.	Student spatially organized and/or labeled many different pieces of code to create a cohesive 3D output.
<b>Transformation</b>	Student showed no evidence of understanding how to manipulate 3D objects in BlocksCAD.	Student was able to manipulate their 3D design in BlocksCAD using simple scaling and translation.	Student used transformations including translation, rotation, and scaling to creatively arrange 3D objects on the axes.
<b>Collaboration (optional)</b>	Student was unwilling to collaborate with peers during the building process or by combining models.	Student collaborated and communicated with peers with some encouragement.	Student eagerly supported peers and collaborated on the design process by combining foods into a shared project.
<b>Discussing Food (optional)</b>	Student was unwilling or unable to express why he/she created the new foods, and how those foods would help people to be healthier.	Student was able to express reasoning for the new or modified food, and how it is an improvement to existing foods or how it advances health.	Student was able to express reasoning for the new or modified food, how it is an improvement to existing food, why it would contribute to better health, and also how it would be grown or produced or combined with other foods or recipes.
<b>Food in the Real World (optional)</b>	Student did not express or understand healthier eating options.	Student is able to discuss healthy eating options to some extent.	Student is able to connect their building experience to the field of nutrition science.





## STANDARDS ALIGNMENT

### CCSS Mathematics:

5.G.1: Use axes to define a coordinate system...Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis

7.G.1: Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

8.G.1: Verify experimentally the properties of rotations, reflections, and translations.

HSG.CO.A.2: Represent transformations in the plane using, e.g., transparencies and geometry software.

### CSTA Coding:

1B-AP-11 Modularity: Decompose (break down) problems into smaller, manageable subproblems to facilitate the program development process.

2-AP-16 Program Development: Incorporate existing code, media, and libraries into original programs, and give attribution.

### NGSS Engineering and Life Science:

MS-ETS1-4: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

MS-LS1-4: Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic specialized plant structures affect the probability of successful reproduction of plants.

HS-ESS3-2: Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.

HS-ESS3-4: Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

5-ESS3-1: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.