

HOW CAN I USE GOOGLE SKETCH UP TO DESIGN A WING FOR MY GLIDER?

INTRODUCTION

This lesson allows students design a wing for a standard glider and use Google SketchUp to draw a 3D model of their glider.

LEARNING OUTCOMES

- Students will learn to read a basic part drawing and gain a basic understanding of how to draw using Google SketchUp.
- Students will use a multi-view part drawing of a basic glider and their design ideas for a wing to generate a Google SketchUp 3D model.

CURRICULUM ALIGNMENT

8108 EXPLORING TECHNOLOGY SYSTEMS BLUEPRINT

004.02 Apply design and problem solving concepts and principles.

007.03 Design and fabricate a transportation vehicle.

008.02 Produce a communications product using one of the following: technical drawings, graphic communication, electronic communication.

NATIONAL TECHNOLOGY STANDARDS - TECHNOLOGY PROBLEM- SOLVING AND DECISION-MAKING TOOLS

Students use technology resources for solving problems and making informed decisions.

Students employ technology in the development of strategies for solving problems in the real world.

NATIONAL TECHNOLOGY STANDARDS - TECHNOLOGY PRODUCTIVITY TOOLS

Students use technology tools to enhance learning, increase productivity, and promote creativity.

Students use productivity tools to collaborate in constructing technology-enhanced models, prepare publications, and produce other creative works.

CLASSROOM TIME REQUIRED

Four 45-minute class periods

TEACHER PREPARATION

The teacher should be familiar with how to use Google SketchUp to draw lines and arcs, to use the protractor tool, and to use the push tool. Practice drawing several basic shapes and converting to 3D using the push tool. It will be helpful to draw the student assignment and save examples at various points under different file names to be able to give students if they struggle with the assignment.

MATERIALS NEEDED

- Computers with Google SketchUp installed for each student
- Google SketchUp Command Game board sheet
- Pencil and Paper

TECHNOLOGY RESOURCES

Students will need their own computer with Google SketchUp installed.

The teacher should have the ability to project a teacher computer with Google SketchUp to make it easier to show the class how to manipulate the program.

PRE-ACTIVITIES FOR STUDENTS

Students will continue to keep a project log. This can be paper and pencil or computer word processing file. Some work with paper and pencil will be required even if the project log is kept electronically.

Display a copy of the blueprint for the basic glider. Review terms from the previous lessons and ask students to tell you the size of the part based on the part drawing. Students need to identify the fuselage, vertical tail wing, and horizontal tail wing.

ACTIVITIES

Instruct students to start Google SketchUp and hand out the Google SketchUp Command Game board sheet. Introduce the game and tell students to check off the correct number of squares as they complete the required task.

Explain to students that they will be asked to share their methods with the class in order to be checked off as the winner.

Model drawing the fuselage and horizontal tail wing for the class. Check student work to ensure they are working successfully to complete a drawing of these two parts on their computer. Dimensions for the parts are to be taken from the basic glider part drawing. Observe student work to ensure that the students are using proper tools and achieving the appropriate look for their glider drawing. Student drawings should look similar to blueprint (enough to be recognizable as the glider).

Model for the class how to use the push tool to place the 3D fuselage and horizontal tail wing together. Have students complete these steps on their drawing.

At the end you can make a frequency table of the student's progress showing how many squares they were able to accomplish. They can anonymously see how they compare to their classmates and you can judge if the students are getting the concept based on how many students are able to obtain close to the average number of squares. Students who have completed all the tasks can share their methods with the class for tasks that are a problem for some students.

GUIDED PRACTICE

Direct students to close their drawing without saving and open the previous drawing. Allow students to finish drawing the basic glider (fuselage, vertical tail wing and horizontal tail wing) and combine the parts into a 3D model using the push tool. Check to ensure student success.

ASSESSMENT

Students will draw their wing design using any available drawing tool, convert to the image 3D and combine the wing with the basic glider to finish their 3D drawing.

MODIFICATIONS

Pre-prepared notes can be made available for students that have difficulty reading or taking notes.

Students can be paired so that at least one of the students is capable of reading instruct sheet.

Students who need help can open one of the teacher created drawing files to help them progress without repetition of difficult tasks or to realign the parts if the 3D view causes difficulties.

ALTERNATIVE ASSESSMENTS

Arrangement can be made for students with special needs to have the directions read to them.

CRITICAL VOCABULARY

Line tool – tool used to draw straight lines

Arc tool – tool used to draw curved lines by clicking on three points

Rectangle tool – tool used to draw a rectangle by clicking on two points

Circle tool – tool used to draw a circle by clicking on the center point and dragging to indicate radius

Protractor Tool – tool used to measure angle to draw next line

Push / Pull Tool – tool used to transform a 2-D object in to a 3-D object

WEBSITES AND RESOURCES

Examples of student work created with Google SketchUp

<http://picasaweb.google.com/gallery.sketchup/EducationK12#slideshow/5340615027918562050>

Google SketchUp Tutorial

<http://sitescontent.google.com/google-sketchup-for-educators/Home/tutorials-and-tips>

Additional Google SketchUp lesson ideas

<http://sitescontent.google.com/google-sketchup-for-educators/Home/google-earth-lesson-plans>

AUTHOR INFORMATION

Russell Sparks teaches Exploring Technology to students in 6th – 8th grades at East Wilkes Middle School, Wilkes County Schools

Exploring Technology is an entry level CTE course giving an overview of various areas of technology and careers associated with these areas. The externship involved work in the applied engineering school of Wilkes Community College and local aerospace industries. Mr. Sparks was introduced to the tools and concepts used to prepare students for careers in the aerospace industry and given an opportunity to see the industry processes. This will allow him to give his students a better understanding of the steps needed to prepare themselves for the future. Lyndell Duvall, Chair of Applied Engineering Technologies, Industrial and Engineering Technology at Wilkes Community College mentored Mr. Sparks.

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