

Science Lessons for Grades 6-8

“Let’s Texture (Be a Texture Artist for an animated film!)”

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Discipline: Understand 2D patterns for given 3D geometrical figures, identify and calculate perimeters and surface areas of 2D and 3D shapes

Grade: 6 to 8

NCTM Standard

Standard 4: Geometry

7.4.4. Construct 2D patterns for 3D objects, such as right prisms, pyramids, cylinders and cones.

Standard 5: Measurement

7.5.1. Compare lengths, areas, volumes, weight, capacities, times and temperature within measurement systems.

7.5.4. Use formulas to find the perimeter and area of basic 2D shapes and the surface area and volume of basic 3D shapes.

7.5.6. Use objects and geometry modeling tools to compute the surface area of the faces and the volume of a 3D object built from rectangular solids.

Purpose/Goal

- Recognize hidden figures of 3D objects
- Correctly measure the perimeter, surface area and calculate the volume of three-dimensional objects
- Correctly use and compare the units for perimeter, surface and volumes.
- Construct three-dimensional objects from

Context

Any common misconceptions related to this topic?

-Students often do not recognize hidden figures of 3D objects and calculate perimeter and surface areas using the sides that they can see and ignore the hidden sides

Any pre-requisite student knowledge needed for this lesson?

-Ability to identify 2D basic shapes (i.e., triangle, rectangle, rhombus, trapezoid, and etc).

-Understanding of the basic attributes and terminology that are used to describe 2D shapes (i.e., equilateral, isosceles, angles, sides, etc).

-Ability to add and multiple numbers.

-Ability to recognize and identify the shape of hidden surfaces in 3D object

Does this lesson fit within a series or strand of lessons?

- series of lessons (this can further proceed into calculating the volumes of 3D shapes)

Preparation

Materials needed: Papers, Posterboard, Markers, Rulers, Glue, images of 3D characters (Mr. Incredible, Shrek, Toy Story, & etc), computer or video for showing animated clip, and measuring tape

Website

None

Motivation

Ask students:

- name what professions are involved in creating animated films. The students may have to investigate professions such as modeler, texture artists, and animators.
- the procedures that 3D modelers and texture artists follow to complete their job tasks.
- Provide a demonstration of how the 3D modelers model animated characters. They use simple 3D geometrical figures (i.e., rectangular prism, cylinder and sphere) to start and manipulate shapes.

Description

The purpose of this lesson is to assist students understand 2D patterns for given 3D geometrical figures. First, students will be instructed on using a formula to find the perimeter and surface area of a basic 2D shape and 3D figures. Students will layout 2D pattern of 3D figures (i.e. rectangular prism and cylinder). By applying the idea of the surface area, students will construct 3D figures by using their layout and calculate the volume of 3D figures.

Day 1:

1. Show a clip of the 3D animated movie.

2. Ask students:

- o name what professions are involved in creating animated films. The students may have to investigate professions such as modeler, texture artists, and animators.

- o the procedures that 3D modelers and texture artists follow to complete their job tasks.

3. Provide a demonstration of how the 3D modelers model animated characters.

- o They use simple 3D geometrical figures (i.e., rectangular prism, cylinder and sphere) to start and manipulate shapes.

4. Students will be assigned to a group

5. Groups will be given images of 3D animated character from various movies.

6. As a group, students must identify at least five 3D geometrical figures that were used in animated character.

7. The students will be asked to present their findings in front of the classes. The images will be projected on to the screen and the groups have to mark or sketch out what geometrical figures they have found.

Day 2:

1. Recap from Day 1

2. Talk about the profession of texture artists in animated films

- o Note: Texture artist gets models (digital file) from modelers. If modeler used rectangular prism to make the arm of animated characters, texture artist unfold that rectangular prism and “texturize” and put it back the shapes and reforming the arm.

3. Students will be informed that they will be texturizing a robot. The robot will be constructed with various three-dimensional geometrical shapes (cylinder arms and fingers, right prism for a body, etc).

4. Each group will be assigned to different parts of the body (one group may be assigned legs, arms or stomach).

5. They will calculate surface area of assigned body parts

6. Each group’s ultimate task is to create appropriate texture for the assigned body part. In order to complete this task:

- Groups will be expected to identify geometrical shapes that are used in the actual model

- Measure the dimension of particular body parts that are assigned to them.

Day 3:

1. Layout the 2D pattern of 3D geometrical shapes on the paper.

*Students are expected to discuss with their group members. They must decide on whether they laid out the correct 2D pattern with appropriate dimensions, construct the 3D geometrical shape out of the 2D pattern that they have created. Construct and decorate the textures that will go onto the actual physical model of the animated character.

Day 4:

1. Finally stage! “Mapped” it onto the physical model (The entire class could participate in this process).

Assessment

Each day of the activity, students are expected to discuss their finding in front of the classroom. Teachers and GK12 fellows can identify whether they use correct terminology or calculations to form 3D figures from 2D shapes. Also, all the calculations (perimeter and surface areas) that are done by students should be collected at the end of the day.

Follow-Up Activities

From this lesson, students are encouraged to think how 2D patterns form into 3D objects. To encourage the students to understand the volume of 3D objects, students will be given a simulated situation. The students must determine the weight of the model and if this is a real creature (They need to add the volumes of each body parts).