Designing with Proportions Unit Plan

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Unit Overview

Unit Title

Designing with Proportions

Unit Summary

Students will use proportions and scale factors to design a character to be made into a doll or action figure. Students will compare the supposed height of their character life-sized to the height they choose for the doll or figurine and determine a scale factor. Using the same scale factor, students will design and calculate the dimensions for the environment/house that their character would inhabit. To present their project, students will create a presentation using PowerPoint and an advertisement poster using Publisher. Students may be divided into groups or work individually.

Subject Area

Geometry, Geometry Survey

Grade Level

9-12

Approximate Time Needed

8 class periods – 50 minutes per period

Unit Foundation

Targeted Content Standards and Benchmarks

South Dakota State Standards

Math - Geometry :

Indicator 2: Use properties of geometric figures to solve problems from a variety of perspectives.

9-12.G.2.1. (Analysis) Recognize the relationship between a three-dimensional figure and its two-dimensional representation.

9-12.G.2.3. (Application) Use proportions to solve problems.

Math – Measurement:

Indicator 1: Apply measurement concepts in practical applications.

9-12.M.1.1. (Comprehension) Choose appropriate unit label, scale, and precision.

Technology

Strand 3 – Information and Communication Tools

Indicator 1: Students recognize and demonstrate skills in operating technological systems.

Indicator 2: Students use technology to enhance learning, extend capability, and promote creativity.

Strand 5 – Information Literacy and Decision Making

Indicator 1: Students use technology to locate and acquire information.
Indicator 2: Students determine the reliability and relevancy of information.

Student Objectives/Learning Outcomes

Students will be able to:

- Design an imaginative character
- Select a scale factor
- Use proportions and a scale factor to calculate dimensions
- Present character, scale factor, and dimensions in a PowerPoint
- Showcase their product in an advertisement poster

Curriculum-Framing Questions

Essential Question	How do reality and imagination coexist?
Unit Questions	• Do unrealistic/realistic toys have an effect on children? • Can toys be realistic and still fun? • How can scale factor be used to make toys more realistic?
Content Questions	• How do you know if two figures are proportional? • What is a scale factor? • How do you use scale factor to create a model?

Assessment Plan

Assessment Timeline

Before project work begins		Students work on projects and complete tasks		After project work is completed	
• Questioning • Project Checklist	• PowerPoint Rubric • Poster Rubric	• Questioning • Group Conferences	• Group Pair/Share	• Project Checklist • PowerPoint Rubric	• Poster Rubric • Group work Self-Evaluation

Assessment Summary

Questioning will be used throughout to help students process content and monitor learning. The project checklist will help students stay on track and self-assess their progress. Part of one class period will be used to do a pair/share activity with the groups. Two groups will meet together, briefly showcase their project, then get input from their partner group. This will give the students the opportunity to do more self-assessment and also assess some of their peers. The PowerPoint and Poster Rubrics will be used by the students to self-assess at the conclusion of the project, and also used by the teacher to assess. Finally, a group work self-evaluation will be given to each student to assess how well he or she thought the group worked together and how much each member contributed.

Unit Details

Prerequisite Skills

- Writing and simplifying ratios
- Solving proportions by cross-multiplying
- Some experience using Microsoft PowerPoint and Publisher

Instructional Procedures

Day 1

Introduce the unit with Designing with Proportions PowerPoint. Ask students to brainstorm examples of when scale factors are used. Pose the question *Do toy companies use scale factor when creating toys?* Discuss with students if dolls and action figures are created to be realistic and to scale.

Introduce the essential question *How do reality and imagination coexist?* Ask students to discuss their thoughts with each other. Ask for volunteers to share their responses with the whole class.

Explain the main project goals with the students. Show teacher example. Assign student groups or let students choose group members. Use remaining time for groups to begin brainstorming possible character ideas and environment plans. Ask students to sketch designs for each as they brainstorm.

Day 2

Show student sample PowerPoint and discuss required elements. Hand out project checklist and PowerPoint grading rubric. Instruct students to use remaining time to finalize character and environment ideas and begin working on final drawings, calculating scale factor and dimensions, and their PowerPoint presentation.

Day 3

Ask students to use the provided links and/or other web resources to research what age recommendation they should give to their character figurine. Students should also continue working on finishing final drawings, scanning their drawings into the computer, and finishing their PowerPoint.

Day 4

Pair each group together with another group. The two groups should take turns sharing their project idea and PowerPoint. The group that is listening should then use the 3,2,1 method to provide some input.

- Ask 3 questions
- Comment on 2 things
- Give 1 suggestion

After group each group is done sharing. Groups can use remaining time to complete their PowerPoint presentations.

Day 5

Show students the sample advertisement poster and discuss required elements. Hand out the poster rubric. Instruct students to use class time to make final adjustments on PowerPoint and begin work on their advertisement poster.

Day 6

Instruct students to use class time to complete their PowerPoint and poster and prepare to present their projects in class the next day. Remind students to use the project checklist to review and finalize their work. Each group should also fill out together their PowerPoint rubric and their poster rubric to self-assess their project.

Day 7 and Day 8 (if needed)

Student groups take turns presenting their projects to the class. All students individually fill out and turn in the group work self-assessment.

Accommodations for Differentiated Instruction

Resource Student	Reduce assignment or allow more time as needed.
Nonnative English Speaker	Group student with English speaking peers
Gifted Student	Have the student serve as helper to other groups in finding dimensions using proportions. Have student also design furnishings using the proper scale factor to place in the environment.

Materials and Resources Required For Unit

Technology – Hardware (Click boxes of all equipment needed)

☐ Camera	☐ Laser Disk	☐ VCR
☒ Computer(s)	☐ Printer	☐ Video Camera
☐ Digital Camera	☒ Projection System	☐ Video Conferencing Equip.
☐ DVD Player	☒ Scanner	☐ Other
☒ Internet Connection	☐ Television	

Technology – Software (Click boxes of all software needed.)

☐ Database/Spreadsheet	☐ Image Processing	☐ Web Page Development
☒ Desktop Publishing	☒ Internet Web Browser	☐ Word Processing
☐ E-mail Software	☒ Multimedia	☐ Other
☐ Encyclopedia on CD-ROM		

Printed Materials	Geometry textbook Copies of project checklist and both rubrics
Supplies	Class set of calculators Mobile Laptop Lab
Internet Resources	American Academy of Pediatrics – Toy Safety • http://www.aap.org/publiced/br_toysafety.htm Babycenter.com – Tips for Toy Safety • http://www.babycenter.com/0_tips-for-toy-safety_423.bc Kidshealth.org – Choosing Safe Toys • http://kidshealth.org/parent/growth/learning/safe_toys.html
Other Resources	