

COURSE: Middle School

UNIT: Engineering Drawing and Measuring Level 1-3

EXERCISE: 3D Modeling Level 1-3

TIME FRAME: 1-2 Hours



PREPARATION: *Summary of “to do’s” that the teacher should understand and prepare before bringing this lesson to the classroom.*

Objectives:

At the completion of this lesson, students will be able to:

- Develop an understanding of 3D modeling and recognition of an object in 3D space
- Apply 2D sketch geometry, rectangle, circle, and dimensions
- Understand 3D features that add and remove geometry including Extrude Base, Extrude Cut, Fillet and Shell
- Complete models for all three levels
- Develop a 3D part based on a selected plane, dimensions and features
- Apply the design process to projects in all three levels
- Math: Understand units of measurement, adding and subtracting material, perpendicularity, x-y-z coordinate system

Resources:

- Internet
- Onshape Program



SAFETY: *Summary of safety strategies in the lesson.*

Please use this space to describe safety procedures or highlights for this lesson.

S1

DESIRED RESULTS:

ESTABLISHED GOALS:

Problem Solving Techniques and Applications Standards:

Science: A1, A3, A4, E1, E3
Math: 3A-3D, 4A, 4B, 8A, 8B, 9A-9C
Technology: 8A, 8C, 9A-9D, 11C, 11D
ABET: A, B, C, G, I, K

TRANSFER:

Students will be able to independently use their learning to...

- Model their own parts and assemblies

MEANING:

UNDERSTANDINGS

Students will understand that...

- 3D modeling can create precise working models

ESSENTIAL QUESTIONS

Students will keep considering...

- Design intent while modeling in Onshape

ACQUISITION OF KNOWLEDGE AND SKILL:

Students will know...

- Modeling techniques and design intent

Students will be skilled at...

- Creating and modifying parts, assembling components and making working drawings

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S2 EVIDENCE:

EVALUATIVE CRITERIA:

- Online test
- 3D Models

ASSESSMENT EVIDENCE:

Performance Task(s):

Task Placeholder
Paragraph Placeholder.

Other Evidence:

- Completed projects and Online test

S3 LEARNING PLAN: *Summary of Key Learning Events and Instruction*

Outline:

1. <Set Induction>
2. In Class Discussion - Onshape
3. Active Learning Exercise - Creating a Basic Part
 - 3.1. Create a New Part Document
 - 3.2. Overview of Onshape
 - 3.3. Sketch shapes
 - 3.3.1. Add Dimensions
 - 3.3.2. Changing the Dimension Values
 - 3.3.3. Extrude the Base Feature
 - 3.3.4. View Display
 - 3.3.5. Save the Part
 - 3.4. Round the Corners of the Part
4. In Class Discussion - Describing the Base Feature
5. Exercises and Projects – All three levels
6. More to Explore - Modifying a Part
7. Lesson Summary
8. Online test

Learning Experiences:

1. <Set Induction> Jump right into the discussion about Onshape.
2. The best way to teach this unit will be through using the videos provided.
3. Have your students follow along and perform each task as you cover it. Each student should be in front of their own computer if your lab permits. Otherwise pair them accordingly.
4. Students should now be comfortable enough within Onshape to create a part of their own

Evaluation:

- Online unit test



DIFFERENTIATION: *Summary of Key Differentiation Techniques*

Please use this space to insert your differentiation techniques. Depending on the needs of students, various techniques might be needed in a classroom, therefore use the information below and experts in the area needed to design your plan for differentiation.

The ASCD Study Guide for Integrating Differentiated Instruction and Understanding by Design: Connecting Content and Kids.
by Carol Ann Tomlinson, Jay McTighe

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Integrating Differentiated Instruction and Understanding by Design: Connecting Content and Kids.
by Carol Ann Tomlinson, Jay McTighe
ISBN-13: 978-1416602842
ISBN-10: 1416602844

Differentiating Reading Instruction
by Laura Robb.
ISBN13: 9780545022989

A Teacher's Guide to Differentiating Instruction
The Center for Comprehensive School Reform and Improvement

CAREER CONNECTIONS: *Summary of Career Opportunities Associated with this Lesson*

Please use this space to insert careers that might be connected to this lesson. This section will need continuous updating as new careers and emerging technologies change the opportunities available in the workforce.

Good sources for career connections:

Occupational Outlook Handbook
<http://www.bls.gov/ooh>

The National Career Clusters® Framework
<http://www.careertech.org/career-clusters>

KEYWORDS: *Please Insert Keywords from this Lesson with their Definitions*

Please use this space to insert keywords and their definitions
Use resources like dictionary.com to find definitions to your keywords