WAMC Lab Template

Math Concept(s): HSG-CO.D.12 making geometric constructions
Source / Text: OSPI standards for math and tech theater costume design
Developed by: Sara Call E-Mail: sjcall@Seattleschools.org Date: 6/25/24

Attach the following documents:

- Lab Instructions
- Student Handout(s)
- Rubric and/or Assessment Tool

Short Description (Be sure to include where in your instruction this lab takes place):

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Lab Plan

Lab Title: Creating a sewing pattern for a cinch sack (coin bag)

Prerequisite skills: The student should have an understanding of how to use a protractor and complete a math equation.

Lab objective: In this lab students will create a specific sized sewing pattern on paper using the math equation C= D + (S x 2) and using that calculation to draw a circle pattern to size with a protractor and then cut it out to use in the next sequential lab.

Standards: *(Note SPECIFIC relationship to Science, Technology, and/or Engineering)*
Mathematics K–12 Learning Standards:

- HSG-CO.D
- Make geometric constructions.
- HSG-CO.D.12
- Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.

Standards for Mathematical Practice:

- 1. Follow instructions and persevere to completion
- 2. Use tools appropriately and strategically
- 3. Reason abstractly and quantitatively
- 4. Attend to precision
- 5. Look for and make use of structure

K-12 Learning Standards-ELA (Reading, Writing, Speaking & Listening):

- Reading Standards for Informational Text 6–12

- 0. By the end of grade 11, read and comprehend literary nonfiction in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 12, read and comprehend literary nonfiction at the high end of the grades 11–CCR text complexity band independently and proficiently

K-12 Science Standards

- N/A

Technology

- There is a video to watch that describes this pattern method for an alternative input. https://www.youtube.com/watch?v=61vbtJR67W8
- Computer and Projector
- Students may access assignment and instructions on Schoology page

Engineering

- N/A

Leadership/21st Century Skills:

21st Century Interdisciplinary themes (Check those that apply to the above activity.)
☐ Global Awareness ☐ Financial/Economic/Business/Entrepreneurial Literacy ☐ Civic Literacy
☐ Health/Safety Literacy ☐ Environmental Literacy

21st Century Skills (Check those that students will demonstrate in the above activity.)

LEARNING AND INNOVATION
Creativity and Innovation
☐ Think Creatively
x☐ Work Creatively with Others
☐ Implement Innovations
Critical Thinking and Problem Solving
x☐ Reason Effectively
x☐ Use Systems Thinking
☐ Make Judgments and Decisions
x☐ Solve Problems
Communication and Collaboration
x☐ Communicate Clearly
x☐ Collaborate with Others

INFORMATION, MEDIA & TECHNOLOGY SKILLS
Information Literacy
☐xAccess and Evaluate Information
☐ Use and manage Information
Media Literacy
☐ Analyze Media
☐ Create Media Products
Information, Communications and Technology (ICT Literacy)
☐ Apply Technology Effectively

LIFE & CAREER SKILLS
Flexibility and Adaptability
☐ Adapt to Change
☐ Be Flexible
Initiative and Self-Direction
☐xManage Goals and Time
☐xWork Independently
☐ Be Self-Directed Learners
Social and Cross-Cultural
☐ Interact Effectively with Others
☐ Work Effectively in Diverse Teams

Productivity and Accountability
☐ Manage Projects
☐x Produce Results
Leadership and Responsibility
☐ xGuide and Lead Others
☐ Be Responsible to Others

Teacher Preparation: (What materials and set-up are required for this lab?)

Materials

- 8.5 x 11” sheet of Paper
- Pencil
- Calculator (to check work)
- Scissors
- Ruler
- compass
- White Board and Projector

Set-Up Required:

- To do this lab Students will need simple desk space in the classroom.

Lab Organization Strategies:

Leadership (Connect to 21st Century Skills selected):

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Cooperative Learning:

- For this lab students will be placed in groups of 2-4 for the pattern creation to facilitate discussion and leadership opportunities. Each student will create their own pattern to use for a sewing project.

Expectations: Students will be able to:

- Demonstrate practical applications for Measuring and calculating to create a pattern for a sewing project using folding techniques, following instructions, completing math calculations.

Timeline: 45-50 minutes

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Post Lab Follow-Up/Conclusions:

Discuss real world application of learning from lab

- Real world applications apply for any field or home project that requires making a pattern to use for a project such as sewing, woodworking, metal fabrication, following simple instructions and using calculations to create a specific size needed for almost any project or category of work.

Career Applications

- Any which require people to create a physical template to use.

Optional or Extension Activities

- Students could create larger or smaller circle patterns depending on their needs for the project.

Costume Design Class, CTE Ms. Call

Making a Pattern

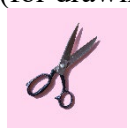
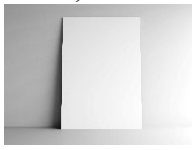
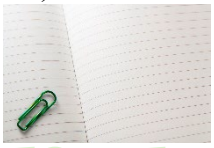
WAMC Lab 1

Instructions for using a mathematical equation for creating and cutting a pattern for a cinch bag sewing project (sewing it will be our next lab!).

Objective: By the end of this lesson, YOU will be able to:

- Calculate the total circumference (cut pattern circle) of a circular pattern including seam allowance.
- Draw a circular pattern on paper using a protractor.
- Cut out the pattern accurately using scissors.
- Each team member will measure and draw using your calculations and cut out their own pattern.

Step I In Teams of 2-4 collect the Materials Needed:

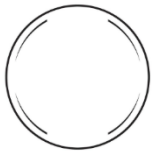
- Pencil or chalk 
- Rulers 
- Compasses (for drawing circles) 
- Scissors 
- Calculator (optional, for checking calculations) 
- 1 Plain Paper  and 1 lined 

Duration: You and your team have 1 class period (approximately 45-50 minutes) to complete this lab.

STEP II Procedure: (15 minutes)

1. **Using the equation below: solve for C**
   if D is the diameter of the circle at 5.0' inches
   and S the seam allowance is ½" or .5" inches

- Make sure you use accurate measurements and calculations in pattern making for sewing. Use the lined paper to work this equation. Your team must show your work.
- USE the equation: $C = (d \times \pi) + (s \times 2)$ where:
  - C is the total circumference (CUT pattern circle).
  - D is the finished diameter of the circular pattern.
  - S is the seam allowance.
  - π (pi) is approximately 3.14.



STEP III Drawing the Pattern (15 minutes)

2. Using the plain paper, rulers, and compasses each student draws the pattern to precision:
3. Draw a circle on the paper with a diameter D that corresponds to their calculated value.
4. Use the compass to mark and measure the seam allowance around the circle.
5. Remember: Neatness and accuracy in drawing both the circle and the seam allowance is important.

STEP IV Cutting Out the Pattern (5 minutes)

1. Once students have completed drawing their patterns, carefully cut out the circular pattern along the outer edge including the seam allowance.
2. Emphasize the importance of precision in cutting to ensure the pattern fits correctly when used for sewing.

STEP V Clean-Up, Label Pattern, Discuss (10 minutes)

1. Clean up your area and put all tools away, label your pattern with your name on it and turn in both your pattern and your calculations paper.
2. Reflect on any challenges you and your team faced and how you overcame them.
3. Discuss the practical applications of these skills in sewing and pattern making.

Assessment: Your math calculations and pattern will be graded as follows 24 points possible.

- **Sewing Pattern Creation Rubric**

Criteria	Excellent (4)	Good (3)	Fair (2)	Needs Improvement (1)
Accurate Calculation	All calculations for pattern dimensions are precise and clearly documented.	Most calculations for pattern dimensions are accurate and clearly documented.	Some calculations for pattern dimensions are accurate and documented.	Calculations for pattern dimensions are inaccurate or poorly documented.
Pattern Completeness	Pattern includes all necessary components (e.g., pieces for front, back, sleeves, etc.)	Pattern includes most necessary components.	Pattern includes some necessary components but may be missing key pieces.	Pattern is incomplete or missing several necessary components.
Alignment with Design Brief	Pattern design aligns perfectly with specified design requirements and measurements.	Pattern design mostly aligns with specified design requirements and measurements.	Pattern design somewhat aligns with specified design requirements and measurements.	Pattern design does not align with specified requirements and measurements.
Use of Mathematical Concepts	Demonstrates a thorough understanding and application of mathematical concepts related to pattern making.	Demonstrates a good understanding and application of mathematical concepts related to pattern making.	Demonstrates a basic understanding of mathematical concepts related to pattern making.	Shows little understanding of mathematical concepts related to pattern making.
Overall Craftsmanship	Pattern is neatly constructed with attention to detail and professional presentation.	Pattern is well-constructed with good attention to detail.	Pattern construction is somewhat neat but lacks attention to detail.	Pattern construction is messy and lacks attention to detail.
Documentation and Presentation	Documentation includes thorough records of calculations, design iterations, and material choices. Presentation is professional and visually appealing.	Documentation includes adequate records of calculations, design iterations, and material choices. Presentation is clear and visually presentable.	Documentation is minimal and lacks detail on calculations, design iterations, and material choices. Presentation is somewhat clear but lacks polish.	Documentation is incomplete or missing records of calculations, design iterations, and material choices. Presentation is unclear and visually unappealing.