Picture Frame build: Area and Perimeter (Lesson 4)

Carpentry

Grades
- Grade 3
- Grade 4

Objective
Students will calculate the perimeter and area of their picture frames.

Concepts
- Measurement
- Angles
- Area
- Perimeter

Description and Trades Connection

In this lesson, students will use measuring tapes and their picture frames to explore the concepts of perimeter and area. They will learn how to calculate the perimeter and area of both the inside space and the outside of their frames. After understanding these concepts, students will measure, cut, and attach a backing to their picture frames using cardboard or cardstock. This hands-on activity will reinforce their math skills and provide practical experience in measurement and cutting. Students will also check whether their corners are square and if their trim is parallel.

This lesson reinforces carpentry skills by teaching students how to accurately measure and find perimeter and area. Understanding these concepts helps carpenters determine the amount of materials needed and ensures precise fitting of components. Additionally, the hands-on experience of cutting and assembling the picture frame mirrors the practical tasks carpenters perform when installing trim and constructing frames.

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Scan to access video demonstrations, activities, classroom resources and more at learninginnovation.ca/k-12STEM

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Picture Frame build: Area and Perimeter

Curriculum Connections

Grade 3 | Math | Measurement

Learning Outcome
Students determine length using standard units.
Knowledge:
- The perimeter of a polygon is the sum of the lengths of its sides.

Understanding:
- Length remains the same when decomposed or rearranged.

Skills & Procedures:
- Determine the perimeter of polygons.

Learning Outcome
Students relate geometric properties to shape.
Knowledge:
- Right angles can be identified using various referents, such as
  - the corner of a piece of paper
  - the angle between the hands on an analog clock at 3:00
  - a capital letter L

Understanding:
- Geometric properties are relationships between geometric attributes.

Skills & Procedures:
- Investigate the relationships between vertices of a polygon, including equal or right angles, using direct comparison or referents for 90°.

Grade 4 | Math | Measurement

Learning Outcome
Students interpret and express area.
Knowledge
- Tiling is the process of measuring an area with many copies of a unit, without gaps or overlaps.
- Area can be measured with non-standard units or standard units.
- The area of a rectangle equals the product of its perpendicular side lengths.

Understanding:
- Area is a measurable attribute that describes the amount of two-dimensional space contained within a region.
- The area of a rectangle can be perceived as square-shaped units structured in a two-dimensional array.

Skills & Procedures
- Determine the area of a rectangle using multiplication.
- Solve problems involving area of rectangles.

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Procedure

Preparation

Review student work; plan to provide extra work time as needed if students haven't completed their picture frames.

Lesson Activities (30 minutes total)

Introduction to Area and Perimeter (4 minutes):

- Tell students that we will be using measuring tapes and their picture frames to do some math today, and putting
- Begin by explaining what perimeter and area are:
  - Perimeter: The total length around the edge of a shape.
  - Area: The amount of space inside a shape.
- Use visual aids or drawings to illustrate these concepts. For example, draw a rectangle on the whiteboard and label its sides (for perimeter) and draw tiles filing the rectangle (for area).
- Tell students that today we will be finding the perimeter and area of their frames.

Calculating Perimeter (8 minutes):

- Explain how to calculate the perimeter of a rectangle:
  - Add up the lengths of all four sides.
  - Formula: Perimeter = 2 × (length + width).
- Provide an analogy to help students understand:
  - Imagine walking around the edge of a garden. The total distance you walk is the perimeter.
- Demonstrate the calculation using the dimensions of the inside space of the picture frame (e.g., 5"x7"):
  - Perimeter = 2 × (5 + 7) = 2 × 12 = 24 inches.
- Have students measure the perimeter of the inside space of their own picture frames and compare their results with the rest of the class.

Time

30 minutes

Materials

- Rulers or other straight edge (optional) - *not included in kit*
- Fiberboard trim 42" (40)
- Mitre box (12)
- Clamps (24)
- Tape measures (12)
- Carpentry pencils (24)
- Hand saw (12)
- Glue gun (6)
- Glue sticks (1 pk)
- Safety glasses (20)
- Gloves 12pk (2)
- Carpentry pencil sharpeners (3)
- Mitre box locking pins (24)

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Procedure

- Next, have students measure the perimeter of the outside of their picture frames. Explain that they need to measure the total length and width of the outer edge of the frame, then use the formula provided (or just measure all the way around).
- Encourage students to share their calculations and discuss any differences.

Calculating Area (8 minutes):

- Explain how to calculate the area of a rectangle:
  - Multiply the length by the width.
  - Formula: Area = length × width.
- Emphasize that this formula only works on a true rectangle; have students check if their lines are parallel and if their corners are 90°.
- Provide an analogy to help students understand:
  - Imagine covering the surface of a table with square tiles 1" on each side. The total number of tiles needed is the area in square inches.
- Demonstrate the calculation using the dimensions of the inside space of the picture frame (e.g., 5"x7"):
  - Area = 5 × 7 = 35 square inches.
- Have students measure the area of the inside space of their own picture frames.
- Next, have students measure the area of the outside of their picture frames. Explain that they need to measure the total area covered by the frame, including the trim.
- Encourage students to share their calculations and discuss any differences.

Measuring, Cutting, and Attaching Cardstock Backing (10 minutes):

- Explain that we will be cutting out backing from cardboard or cardstock to fit the exact dimensions of the picture frame.
- Demonstrate how to measure the dimensions of the frame and mark them on the cardboard or cardstock using a ruler or other straightedge and a 90° tracer.
- Show how to use scissors to cut out the backing accurately.
- Emphasize the importance of careful measurement and cutting to ensure the backing fits perfectly.
- Demonstrate how to apply the hot glue to the edges of the frame and press the backing into place.
- Discuss safety precautions when using hot glue guns. Teachers can decide whether students will use the glue guns or if the teacher will assist.
- Ensure all students have securely attached their backing to the frame.

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Assessment and Online Resources

Assessment Suggestions

- Collect student work; assess for listed Alberta Ed outcomes
- Exit slip with a perimeter and area question
- Short quiz assessing listed Alberta outcomes
- Picture frame gallery walk

Online Resources

- Mitre Box - Home Page (Lethbridge Polytechnic, 2023)
- Mitre Box Kit: Overview Video [0:47] (Lethbridge Polytechnic, 2023)
- Mitre Box Kit: Station Setup [7:34] (Lethbridge Polytechnic, 2025)
- Mitre Box Kit: Picture Frame Project [10:28] (Lethbridge Polytechnic, 2024)

Extension Activities

- **Art project:** painting and/or decorating their picture frames
- **Advanced picture frame:** students could make a frame with more advanced measurements i.e. four 22.5 degree cuts to make the corner instead of a two 45 degree cuts
- **Free Mitre Box use:** students could use their new skills to build something else of their choosing out of leftover materials (ideas: diamond, pine tree, tie fighter, star, parallelogram, trapezoid).

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