Lab Framework

Text: Applied Mathematics

Unit number and title: 15 Using Formulas to Solve Problems

Short Description: Students will calculate the materials for a picture frame using a formula and then make a frame of wood or of wallpaper.

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Date:

Lab Title
Frame It

LAB PLAN

TEACHER: Teacher Prep/ Lesson Plan

- **Lab Objective**
  - Use formulas.
  - Arrange the parts of a formula to fit a problem.
  - Substitute values in a formula and find an answer.
  - Use measuring, marking and cutting skills with accuracy.
- **Statement of pre-requisite skills needed** (i.e., vocabulary, measurement techniques, formulas, etc.)
- **Vocabulary**
- **Materials List**
  - Wallpaper border or wood
  - Scissors or table or miter saw
  - Rulers or measuring tapes
  - Tape or glue and biscuits
  - Job packets which include: the picture size, the width of the rabbet required, the width of the frame material.
- **GLEs (State Standards) addressed**

  Student understands and applies the concepts and procedures of mathematics:
  1.1., 1.2, 1.3, 1.4, 1.5
  Student uses mathematics to define and solve problems:
  2.1, 2.2, 2.3
  The student uses mathematical reasoning: 3.1, 3.2, 3.3.
  The student communicates knowledge and understanding in both everyday and mathematical language. 4.1, 4.2, 4.3.
  The student understands how mathematical ideas connect within mathematics to other subject areas, and to real life situations. 5.1, 5.2, 5.3

  Reading: (Reading)
  Writing: (Writing)
- **Leadership Skills**

- **SCAN Skills/Workplace Skills**

- **Set-up information**

- **Lab organization**(-Grouping/leadership opportunities/cooperative learning expectations; -**Timeline required)**
  Students work in teams of 3 and individually. Each student will have their own job and will have their project checked by the other students in their group.
  2 class periods

- **Teacher Assessment of student learning** - See grading Rubric
  Students show all their work
  Identify the variables
  Accurately substitute all the variables with the dimensions given in the problem.
  The following dimensions must be within 1/16" of the correct measurement.
  Frame material width
  Finished frame width
  Finished frame height
  Dimension between the rabbet joints must match the picture width and length dimensions.

- **Summary of learning** (to be finished after student completes lab)
  -discuss real world application of learning from lab
  -opportunity for students to share/present learning

- **Optional activities**

- **Career Applications**

LAB TITLE: Frame It
STUDENT INSTRUCTIONS:

- **Statement of problem addressed by lab**
  Everyone has framed pictures on their walls. The frames are often mass-produced but many people have pictures that require a custom frame. These frames can be built by people in specialty frame shops or by custom furniture makers. You will be working with a formula that will allow you to calculate the amount of material you will need. You will then mark, measure, cut, and assemble your frame.

- **Grouping instructions and roles**
  Students work in teams of 3 and individually. Each student will have their own job and will have their project checked by the other students in their group.

- **Materials**
  Ruler or tape measure
  Protractor or combination square
  Scissors, table saw, or miter saw
  Tape or glue and biscuits
  Wallpaper or wood
  Job order

- **Procedures** – steps to follow/instructions
  1. Look at the diagram on the next page and read and identify the new terms.
  2. Look at the diagram and formula and identify the variables
  3. Use the diagram and formula to determine the material you need for your frame.
  4. Measure and cut accurately a strip wide and long enough to make your frame.
  5. If you are not in a wood shop skip step 5 and measure for your rabbet joint along back edge of your "frame".
  6. After you have ripped and jointed your stock to the correct width you will route a profile along one edge of our stock..
  7. Then you will cut a rabbet joint along the opposite edge of your stock..
  8. Now carefully measure and mark for your 4 pieces. Your teacher **must** sign off your plan **before** you cut your miter joints.
  9. Cut your frame sides to length. Be very accurate so your miter joints have no gaps and your corners are 90 degrees when you are done assembling your frame.
  10. Assemble your frame by placing your 45 degree cuts together and taping them on the back side.

- **Outcome instructions**

Individual work sheet

Name: _____ Period: _____ Date: _____

Calculations checked by: _____
_____

Write the formula:

_____

Fill in the known values:

_____

Solve the problem:

Grading Rubric

_____ Label the diagram correctly 1-5

_____ Accurate measuring. 1-5

_____ Accurate Joinery 1-5

_____ Neat assembly 1-5

_____ Accurate dimensioning 1-5

_____ 90 degree corners 1-5

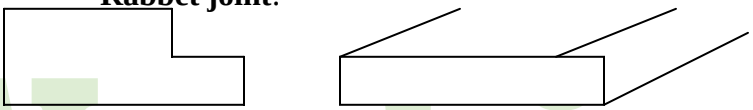
____/30___ Total

Percent _____

Picture Frame

New Terms to know:

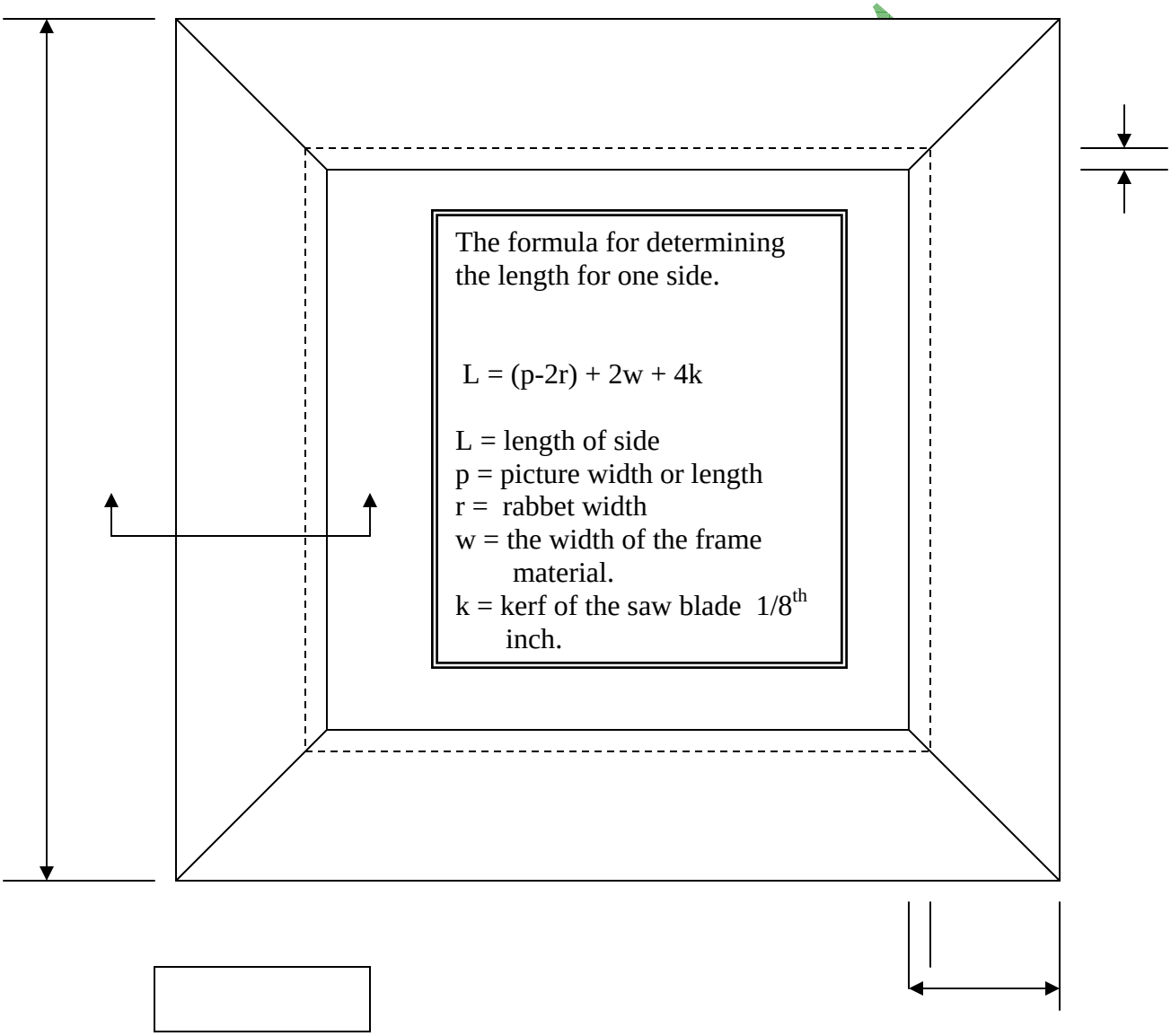
Rabbet joint:



Miter Joint: Two pieces of material cut at 45 degrees that when joined make a 90 degree corner.

Profile: a design cut on the edge of a board.

Kerf: the thickness of a saw blade.



Lab Data Collection

Student: _____ Date: _____

Unit: 15

Lab Title: Frame It

Criteria: Write the problem/objective in statement form

Data Collection: Record the collected/given data

Calculations: Complete the given calculations to solve for an answer(s)

Summary Statement:

Other Assessment(s)