Chicago Public Schools Cluster--Transportation
Program Title—Auto Body Repair
Course Name—Automotive Body Repair I - Sophomore
Lesson Title—Straighten Damaged Panels

Unit—Collision Repair
Problem Area—Non-structural Damage
Lesson—Straighten Damaged Panels

Illinois State Goal and Learning Standard. This lesson is correlated with the following State Goal, Learning Standard, and Performance Descriptor:

English Language Arts Goal 1: Write to communicate for a variety of purposes.
Learning Standard B: Students who meet the standard can compose well-organized and coherent writing for specific purposes and audiences.
Performance Descriptor: I1. Use writing process of prewriting, drafting, revision, editing, and publication to produce work.

NETS 1. Critical Thinking, Problem Solving, and Decision Making:
   b. Students plan and manage activities to develop a solution or complete a project

Workplace Skills: H. Solving Problems and Critical Thinking
   5. Evaluate options

SCANS: C. Thinking Skills: Problem Solving – recognizes problems and devises and implements plan of action

CTE Auto Body Repair Technical Skills
   F09: Straighten and rough-out contours of damaged panels to a suitable condition for body filling or metal finishing using power tools, hand tools, and weld-on pull attachments

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Analyze the type of metal damage
2. Choose a straightening technique
3. Repair the damage

List of Resources. The following resources may be useful in teaching this lesson:


List of Equipment, Tools, Supplies, and Facilities

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<th>Item</th>
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<tr>
<td>D.A. sander</td>
<td>Filler</td>
<td>Safety Goggles</td>
<td>Shrinking hammer</td>
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<tr>
<td>Damaged Fender</td>
<td>Grider</td>
<td>Sand paper: 80</td>
<td>Slide hammer</td>
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<tr>
<td>Dolly</td>
<td>Hardener</td>
<td>and 40-grit</td>
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<td>Drill</td>
<td>Pick Hammer</td>
<td>Sanding block</td>
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Terms. The following terms are presented in this lesson:

- crown
- D.A. sander
- direct damage
- dollyblock
- feathering
- grinder
- indirect damage
- pick hammer (dinging hammer)
- pull rods
- slide hammer

Interest Approach. Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situation. A possible approach is included here.

To pique interest in a career in auto body repair, use the accompanying Power Point slide labeled “Could you see yourself making this look like this?”
Summary of Content and Teaching Strategies

Objective 1: Analyze the type of metal damage
Anticipated Problem: How does the technician analyze the type of damage?

I. Analyze the type of metal damage
   A. Visually inspect the damage of a panel
      1. Inspect for crown (convex curve or line on body panel)
      2. Inspect for indirect damage (damage that occurs away from the point of impact)
   B. Physically inspect the damage.
      1. Locate high and low spots by running a straightedge parallel along the panel damage
      2. Draw a circle around all high spots and mark all low spots with an “X.”
   C. Types of damage.
      1. Indirect damage
      2. Direct damage is damage that occurs at the point of impact.

Many techniques can be used to help students master this objective. The teacher can demonstrate the process by directing a student through the tasks of marking a dented panel. The student can refer to VM-A to view a panel already straightened using a slide hammer.

Objective 2: Choose a straightening technique
Anticipated Problem: How does the technician choose a straightening technique?

II. Choose a straightening technique
   A. If there is no access to getting behind the dent then the technician will use a slide hammer, a device with a hammer head that is slid along a rod and against a stop, so that it pulls against the object to which the rod has been fastened.
   B. If—after using the slide hammer—small low spots remain, they can be removed using a pull rod, tools that allow repair work to be performed from the outside of the damaged panel.
   C. A pick hammer, a hammer with a pointed shank on one end of the head and a flat face on the other, is used to tap down high spots.
   D. Dollyblock, an anvil-like, metal hand tool, is held on one side of a dented panel
while the other side is struck with a **dinging hammer (pick hammer)**.

Many techniques can be used to help students master this objective. The teacher can demonstrate each of the straightening processes by directing a student through each step of the straightening process. Use VM-B to show an example of a damaged body panel. The student can refer to LS-A to help determine the straightening technique to use.

**Objective 3:** Repair the damage

**Anticipated Problem:** How does the technician repair the damage?

III. Repair the damage
   A. Straighten the damaged area
      1. Drill holes
      2. Screw in slide hammer
      3. Remove dent
   B. Inspect for high spots
      1. Tap down with pick hammer
      2. Knock down high spots with hammer and dolly block
   C. Grind the damaged area using a **grinder** (electric or pneumatic tool used to sand with orbital action)
   D. Fill the low spots by applying first coat of filler
   E. Shape the filler using sanding block with 40-grit paper
   F. Apply second coat of filler
   G. Shape filler using sanding block with 80-grit paper
   H. Apply thin coat of putty
   I. Using block sander, sand putty with 180-grit paper
   J. **Feathering** is the process of using sandpaper to taper the paint surface around a damaged area, from the base metal to topcoat of the surrounding area with **D.A. sander** (rotary power tool used to remove paint and locate low spots in panels)

Many techniques can be used to help students master this objective. The teacher can demonstrate each step of the repair process by directing a student through the tasks of the process. Use VM-C to show what the finished product, a repaired body panel, should look like.
Review/Summary. Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Questions at the ends of chapters in the textbook may also be used in the review/summary.

Application. Use the included visual masters and lab sheet to apply the information presented in the lesson.

Evaluation. Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activities. A sample written test and an academic assessment are provided.
Answers to Sample Test:

Part One: Short Answer

1. The technician drills holes to screw the dent puller into the panel and then slides the hammer back to remove the dent
2. To level high spots and create a rough surface for filler to stick to
3. Grind and then apply first coat of filler
4. Place filler on mixing sheet, apply one strip of hardener across top and then stir until all are one color
5. With a sanding block using 40-grit paper

Part Two: Multiple Choice

1. a. 40 
2. c. Hardener
3. b. Pick Hammer
4. b. Stretching
5. b. 80
6. c. D.A. sander
7. c. To fill scratches and imperfections
8. b. Fiberglass filler
9. b. Pull rods

Part Three: True and False

1. T
2. T
3. T
4. F
5. T
6. T
SAMPLE TEST Straighten Damaged Panels

Name____________________________________ Date ______________________

Part One: Short Answer

Instructions: Use the space provided to answer the following questions in complete sentence form.

1. How is a slide hammer used?

2. After straightening the damage, why do you grind the metal?

3. What is the next step after roughing out the damage?

4. How is plastic filler mixed?

5. How is the first coat of filler shaped?

Part Two: Multiple Choice

Instructions: Write the letter of the best answer on the blank before each number.

___ 1. What grit paper is used to block the first coat of filler?
   a. 40
   b. 80
   c. 120

___ 2. What must be mixed with filler to harden it?
   a. thinner
   b. paint
   c. hardener

___ 3. Which hammer is used to tap down high spots?
   a. ball peen
   b. pick hammer
   c. shrinking hammer
4. If hitting too hard against a dolly, what will occur?
   a. crown
   b. stretching
   c. shrinking

5. What grit paper is used on second coat of filler?
   a. 24
   b. 80
   c. 120

6. What tool is used to feather edge?
   a. grinder
   b. pull rod
   c. DA sander

7. Why do you apply putty over the last coat of filler?
   a. to make it shine
   b. to sand the surface
   c. to fill scratches and imperfections

8. If a slide hammer is used, what should be put on before filler?
   a. hammer
   b. fiber glass filler
   c. primer

9. What tools should you use to pull small low areas?
   a. chain
   b. pull rods
   c. hammer
Part Three: True and False

Instructions: Determine whether the following statements are true or false and write T or F in the space provided.

_______  1. Damage should be removed in the opposite order it was caused.
_______  2. Tears in the metal should be welded before filling.
_______  3. You would use a shrinking hammer to remove high spots.
_______  4. Holes do not have to be drilled to use a slide hammer.
_______  5. To use the stud gun puller, you must weld studs on.
_______  6. After all damage is straightened, priming would come next.
VM–A. Straightened Body Panel

Example of a panel that was straightened using a slide hammer
VM-B. Damaged Body Panel.

Example of a damaged panel
VM-C. Repaired Body Panel.

Picture of a repaired body panel
LS-A. Student Lab Sheet: Fender Inspection

Name or Group Number __________________________

Purpose  The purpose of this activity is to make sure students understand inspection process

Materials  Damaged fender, straight edge, markers, inspection sheet

Procedure  1. With your partner, locate your fender and complete the visual inspection.
        2. As you go through the visual inspection, each team will complete the checklist below to determine the following
           a. Type of damage
           b. High and low spots
           c. Straightening technique

Visual Inspection Checklist

a. Type of damage: _____ Direct
    _____ Indirect
    _____ Both

b. Number of low spots _____________ Number of high spots _____________

c. Proposed straightening technique:
Academic Assessment: Expository Essay

Performance Standard 3B. 11.

Each student will write a multi-paragraphed expository essay in which he/she explains the tasks and techniques that are necessary to assess and straighten a damaged fender. The paper will be graded for organization, content and conventions, and the results will be totaled to determine the student’s performance accordingly:

- **Three essential paragraphs present--Analyze Damage, Choose a Technique, Repair:** All three elements present with detailed explanation
- **Accuracy of Information:** Thirteen steps written in sequential order; the writer placed information in the correct category
- **Conventions:** Writing is free of errors in capitalization, punctuation, grammar, and spelling.

Procedures

1. In order to compose well-organized and coherent writing for specific purposes and audiences (3B), students should experience sufficient learning opportunities to develop the following:
   - Use writing process of prewriting, drafting, revision, editing, and publication to produce work.

2. Auto Body students will review and discuss the assessment task and how the rubric will be used to evaluate their work.

3. Each student will write a three-paragraph essay explaining all steps and procedures used to straighten body panel.

4. Each student’s performance will be evaluated using the rubric. Add each student’s scores to determine the performance level.
Academic Assessment: Performance Standard 3B. I1

Straightening Damaged Panels Essay

Instructions

You have spent the last four weeks straightening damaged panels using many tools and techniques. Today, you will demonstrate your comprehension of the entire process by writing a three-paragraph essay.

MAKE SURE THAT:
Paragraph 1: Explains how the technician analyzes the damage.
Paragraph 2: Explains how a straightening technique is chosen.
Paragraph 3: Describes the 10 steps needed to repair the damaged panel. (The steps must be in order.)

Your essay will be assessed on the following:
  Accurate Information
  Organization of Information in Paragraphs
  Conventions (spelling, complete sentences, punctuation)
**Scoring Rubric:** Damaged Panel Essay

NAME __________________________________ DATE _______________________

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**Total Points___________**

- **Exceeds Standards:** 10-12 total points
- **Approaches Standards:** 6-7 total points
- **Meets Standards:** 8-9 total points
- **Begins Standards:** 5 total points