

Lesson A3–13

Preparing Surfaces and Selecting Paints/Preservatives

Unit A. Mechanical Systems and Technology

Problem Area 3. Construction Systems

Lesson 13. Preparing Surfaces and Selecting Paints/Preservatives

New Mexico Content Standard:

Pathway Strand: Power, Structural and Technical Systems

Standard: VIII: Plan, implement, manage, and/or provide support services to facility design and construction; equipment design, manufacture, repair, and service; and agricultural technology.

Benchmark: VIII-B: Follow architectural and mechanical plans to construct building and facilities.

Performance Standard: 1. Identify and select appropriate building materials. 5. Paint or protect with coatings.

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

1. Explain how to plan the work and assemble the tools and supplies.
2. Explain how to prepare surfaces for painting.
3. Explain how to select paint and preservatives.

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

Recommended Resources. One of the following resources should be selected to accompany the lesson:

Burke, Stanley R., and T.J. Wakeman. *Modern Agricultural Mechanics*. Danville, Illinois: Interstate Publishers, Inc., 1992. (Chapter 15)

Herren, Ray V., and Elmer L. Cooper. *Agricultural Mechanics Fundamentals & Applications*. Albany, New York: Delmar Publishers, 2002. (Text, Lab Manual, & Teacher's Manual, Units 27–28)

Burkybile, Carl. *Paints and Painting*. University of Illinois: Information Technology & Communication Systems (U3053).

Phipps, Lloyd J., et al. *Introduction to Agricultural Mechanics*, Second Edition. Upper Saddle River, New Jersey: Prentice Hall Interstate, 2004. (Textbook, Chapter 15)

List of Equipment, Tools, Supplies, and Facilities

Writing surface

Overhead projector

Transparencies from attached masters

Surface preparation tools and supplies

Terms. The following terms are presented in this lesson (shown in bold italics):

Alkyd-oil paint

Feathering

Flat finish

Gloss finish

Latex paint

Long-oil alkyd paint

Medium-oil alkyd paint

Mildew

Oil base paint

Semi-gloss finish

Short-oil alkyd paint

Stain blocker paint

TSP (trisodium phosphate)

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

Show students samples of old wood that are unpainted and painted. Talk about how paint beautifies and protects the wood. Ask students what needs to be done to prepare wood for painting. Show the tools and supplies that are used in surface preparation. Also show different types of paint and briefly discuss how the paint is selected for a given job.

Summary of Content and Teaching Strategies

Objective 1: Explain how to plan the work and assemble the tools and supplies.

Anticipated Problem: What needs to be done prior to preparing a surface for painting?

- I. Before you brush, roll, or spray a drop of paint, there are certain preparations you should make to ensure a good job with a minimum of effort, errors, and splattering. Start by gathering together all the tools and equipment you will need.
 - A. Paint scraper, wire brush, sandpaper, emery cloth, putty knife, hammer, caulking gun with caulking, glazing putty, spackling compound or drywall paste, and paint remover are some things you might need to prepare the surface for painting.
 - B. Assemble drop cloths, old newspapers, and masking tape to protect areas you do not want painted. Vaseline or other protective cream can be used to coat hands and arms to make paint clean-up easier. Another option is to wear gloves.
 - C. Determine how much paint you will need. Figure the number of square feet to be covered and divide by the coverage per gallon of the paint you intend to use. The type of paint, the surface to be painted, the application method, and whether it is a primer or finish coat all affect the square feet that can be covered per gallon. The more porous the surface, the more the paint soaks in and the less square feet per gallon it covers. One gallon of paint “sprayed on” goes farther than when “brushed on”. Paint used as a primer coat covers less square feet than when used for the finish coat.

Assign students to read the suggested chapters in the recommended resource texts in order to fully understand the content. Use TM: A3–13A to compare the number of square feet different types of paint will cover in a variety of situations. TM: A3–13B provides a good summary of the tools and supplies used to prepare the paint.

Objective 2: Explain how to prepare surfaces for painting.

Anticipated Problem: How are surfaces prepared for painting?

- II. The finest paint, applied with the greatest skill, will not produce a satisfactory finish unless the surface has been properly prepared. The principles are simple. The goal is to provide a surface to which the paint can make a strong, permanent bond. The surface must be clean, smooth, and free of loose particles such as dust and old paint.

- A. New lumber requires very little preparation for painting. Any loose grain or splinters in low-grade lumber should be removed and the surface made as smooth as practical. This can be done by using a hand scraper, plane, or sandpaper “with the grain”, not “across the grain”. Any oil, grease, or sap spots should be removed with mineral spirits, turpentine, or other solvent. Loose knots should be sealed in place with shellac.
- B. Surface preparation of previously painted wood surfaces depends on the state of deterioration of the paint. A dirty paint coating just needs to be dusted or washed off with water. Scrubbing with detergent may be necessary on areas where dirt is embedded. Chalked or powdered paint should be removed with water and a stiff bristle brush. When paint deteriorates, it first checks and cracks. The next steps are crumbling and flaking. Crumbling and flaking lead to curling, blistering, and peeling. All loose, curled, and blistered paint should be removed with a scraper, wire brush, or sandpaper. ***Feathering*** is when hand sanding of the paint around bare spots leaves a gradual transition from the bare wood to the painted surface. Bare wood spots should be covered with a primer coat before repainting.
- C. Fill all cracks, joints, crevices, and nail holes with wood putty, plastic wood, or caulking. When using caulking select a paintable quality acrylic latex (butyl latex where continuous wetting occurs) caulking.
- D. If any nails have “popped” drive them back. Re-nail any loose boards, and replace any rotted or damaged ones.
- E. Any stains or discolorations should be removed. **Mildew** is a black fungus-based stain that occurs in moist conditions. Wash the area with household bleach or TSP diluted in warm water. **TSP** (trisodium phosphate) is a heavy duty cleanser that is mixed at the rate of $\frac{1}{4}$ lb. per gallon of water. It is recommended that you wear rubber gloves and goggles when using TSP. **Stain blocker paint** covers stained areas to prevent the stain from showing through the finish coat of paint.
- F. When preparing to paint concrete, allow a minimum of 30 days for aging and drying to occur.
- G. When preparing metal for painting, use solvent to remove any oil film. Emery cloth, wire brushing, coarse sandpaper, or sandblasting can be used to remove rust.

Utilize the suggested chapters in the recommended resource texts. They contain more detailed information on this topic. Explain the differences in preparing new wood and old previously painted wood for painting. Use TM: A3–13B to show surface preparation tools and supplies. Use TM: A3–13C to show stages of paint deterioration.

Objective 3: Explain how to select paint and preservatives.

Anticipated Problem: How can I determine the best paint to use for a given job?

- III. Unless you are an experienced painter, consult with a reliable salesperson or paint store owner before you shop for paint. Find one who is willing and able to help you match the

paint to the job. Read labels and company leaflets carefully. They are usually well-written, accurate, and helpful. Always select and use quality paint.

- A. Paints are either oil base or latex. **Oil base paint** is a solvent-based paint (used mainly as an exterior finish) that is cleaned up with turpentine, paint thinner, or a commercial brush cleaner. Professional painters recognize its durability and superior protection against moisture. **Alkyd-oil paint** is a combination of oil and alkyd resin resulting in a faster drying, harder, more durable paint surface. Alkyd-oil paints may be short, medium, or long oil paints. **Short-oil alkyd paints**, commonly used as appliance and automotive enamels, dry the most rapidly and form the hardest film. **Medium-oil alkyd paints** are the paint sold as porch and floor enamel. **Long-oil alkyd paints** are the high quality interior paints and exterior trim enamels that have great elasticity and exterior durability.
- B. **Latex paints** are water-based paints that are used as either an exterior or interior paint. They are easy to apply, quick drying, have good color retention, are water thinned, and offer convenient clean up with soap and water. The disadvantages are that they do not adhere and penetrate as well as oil base, especially on a chalky or dirty surface. For these reasons, most professional painters prefer using oil base paints as exterior primers. Acrylic latex is a rapid drying, durable, color retentive, and moisture resistant paint that is gaining in popularity.
- C. After making the oil base vs. latex decision, you must choose between flat, semi-gloss, and gloss finishes. The degree of gloss and washability desired are factors in the choice. **Flat finish**, sometimes called an eggshell finish, can be washed occasionally and dries with little gloss. **Semi-gloss finish** produces a moderate gloss that withstands wear and washes well. It is often used for walls and ceilings in kitchens, bathrooms, and laundry rooms, or as a trim paint in areas where a flat paint is used. **Gloss finish** is a high priced paint that is durable and washes well, but brings out all defects in the surface. Gloss finish paints can provide an excellent coating if you are willing to spend extra time preparing an extremely smooth, well-primed surface.

Readings in the suggested references will be helpful to students. Each reference contains more complete information that will help them to comprehend the content. Emphasize the importance of paint selection in completing a quality paint job.

Review/Summary. Use TM: A3–13A to review the coverage per gallon of paint on various surfaces. Talk about the process of planning the job—determining the number of gallons of paint needed. Look at the surface preparation tools and supplies. Review how they are used to prepare new wood and previously painted wood for painting. Have an assortment of paints and review the advantages of each type and discuss when each would be used.

Application. Identify a painting job that needs to be done at school or in the community. Gather the tools and supplies together. Prepare the surface for painting. Figure the gallons of paint needed to do the job. Do the painting as a part of the lesson A3–14 (Selecting Applicators and Applying Finish).

Evaluation. Take the written test and evaluate the surface that students prepare for painting.

Answers to Sample Test:

Part One: Matching

1 = h, 2 = a, 3 = j, 4 = f, 5 = c, 6 = g, 7 = e, 8 = b, 9 = i, 10 = d

Part Two: Completion

1. Feathering
2. Mildew
3. TSP (trisodium phosphate)
4. with, across
5. less

Part Three: Short Answer

1. Figure the number of square feet to be covered and divide by the coverage per gallon of the you intend to use. Use the chart on the paint can to see how many square feet per gallon the paint will cover.
2. List of five of these six steps in paint deterioration:
 1. Chalking
 2. Checking or cracking
 3. Crumbling or flaking
 4. Curling
 5. blistering
 6. Peeling

Sample Test

Name _____

Test

Lesson A3–13: Preparing Surfaces and Selecting Paint/Preservatives

Part One: Matching

Instructions. Match the term with the correct response. Write the letter of the term by the definition.

- | | | |
|-----------------------|---------------------------|----------------------------|
| a. alkyd-oil paint | e. latex paint | i. semi-gloss finish paint |
| b. flat finish paint | f. long-oil alkyd paint | j. short-oil alkyd paint |
| c. gloss finish paint | g. medium-oil alkyd paint | |
| d. Kilz or Bin paint | h. oil base paint | |

- _____ 1. Paint cleaned up with a petroleum-based solvent preferred by professional painters as an exterior primer paint.
- _____ 2. Paint that is fast drying, for a harder, more durable surface composed of an oil and alkyd resin.
- _____ 3. Paint commonly used as an appliance and automotive enamel.
- _____ 4. Paint that is a high quality interior paint or an exterior trim enamel with great elasticity and durability.
- _____ 5. Paint finish that is a high priced paint that is durable, washes well, and brings out all defects in the surface.
- _____ 6. Paint sold as porch and floor enamel.
- _____ 7. Paint preferred by homeowners partially because of easy clean-up with soap and water.
- _____ 8. Paint finish type that is usually used on interior walls.
- _____ 9. Paint finish that withstands wear, washes well, and is used in kitchens, bathrooms, and as a trim paint (where a flat paint was used).
- _____ 10. Paint that is used to block stains from showing through.

Part Two: Completion

Instructions. Provide the word or words to complete the following statements.

1. _____ is when hand sanding of the paint around bare spots leaves a gradual transition from the bare wood to the painted surface.

2. _____ is a black fungus caused stain that occurs in moist conditions.
3. _____ is a heavy duty cleanser that is mixed with water to clean and remove stains on a paint surface.
4. Always sand _____ the grain rather than _____ the grain.
5. The coarser the surface the _____ area a gallon of paint will cover.

Part Three: Short Answer

Instructions. Provide information to answer the following questions.

1. How can you calculate the amount of paint to purchase for a painting job?
2. List at least five steps that occur in the process of paint deterioration:

AVERAGE PAINT COVERAGE PER GALLON

(Brush Painting)

SQUARE FT./GALLON

TYPE OF PAINT	ONE COAT	TWO COATS
Exterior oil base paint		
Wood	470	250
Concrete blocks	180	105
Porch and deck paint		
Wood	380	200
Concrete	450	260
(troweled finish)		
Stain blocker paint		
Wood	400	N/A
Concrete blocks	300	N/A
Interior latex paint	540	310
Liquid wood stain	150	90
Clear sealer		
Varnish or Shellac	540	270

SURFACE PREPARATION TOOLS AND SUPPLIES

TOOLS

- **Paint scraper**
- **Wire brush**
- **Putty knife**
- **Plane**
- **Glazing putty tool**
- **Sander**
- **Caulking gun**
- **Hammer**

SUPPLIES

- **Sandpaper**
- **Emery cloth**
- **Steel wool**
- **Wood filler**
- **Glazing compound**
- **Caulking**
- **Glazing putty**
- **Nails**
- **Spackling compound**
- **Drywall paste**
- **Paint drop cloths**
- **Paint remover**

STAGES OF PAINT DETERIORATION

Dirty paint

... wash with detergent and water

Chalked or powdered paint

**... wash with water and a stiff
bristle brush**

Checked and cracked paint

**... scrap or sand to a clean smooth
surface**

Crumbling and flaking paint

**... scrap and sand to a clean
smooth surface**

Curling, blistering, and peeling paint

... scrap to remove loose paint

**... feather paint edges with
sandpaper**

**... prime bare spots before
applying finish coat**

Stained paint

**... wash with a bleach or TSP
warm water solution**

**... prime stained areas with stain
blocker paint such as Kilz or Bin**