Painting
Lesson Three: Buying Paint

Facilitator Guide

Building Basics was paid for under an EL Civics grant from the U. S. Department of Education administered by the Virginia Department of Education. It was paid for under the Adult Education and Family Literacy Act of 1998; however, the opinions expressed herein do not necessarily represent the position or policy of the U. S. Department of Education, and no official endorsement by the U. S. Department of Education should be inferred. This document was designed and created by the Virginia Adult Learning Resource Center at Virginia Commonwealth University, 817 West Franklin Street, Suite 221, P.O. Box 842037, Richmond, VA 23284-2020. It may be reproduced for nonprofit, educational purposes only.
Lifeskill Objective: Learners will be able to read paint can labels and identify the type and use of the paint. They will also be able to calculate the approximate number of gallons of paint needed to paint the interior surfaces of a house. In doing so, learners will review and practice the steps in finding surface area and several other basic construction-related math functions.

EFF Skills: Speak So Others Can Understand, Work Together, Cooperate with Others, Observe Carefully, Listen Actively, Use Math to Solve Problems and Communicate

SCANS Skills: Resources (allocate facility and material resources)
Interpersonal (participate as member of a team; teach others; work with individuals from a variety of ethnic, social or educational backgrounds; work and communicates with co-workers; provide basic leadership and negotiation skills)
Information (acquire, evaluate, organize, and maintain information related to the estimation of paint areas; this information is then interpreted and communicated through a variety of methods)
Systems (provide basic understanding of systems)
Technology (determine the procedures and tools needed to produce the desired results)

Lesson Length: 2 hours

Tools

Laying the Foundation: Lost in the Paint Aisle--overhead

Activity #1: One paint can (new or used) with clean label
              Paint On Sale Handout
              Complete Color Palette--with gloss sample strips; from local paint store
              Paint Can Labels--optional
              Paint On Sale Handout--one copy with paint cans cut out for whole group chart

Activity #2: Paint Calculation Practice Handout
              Paint Calculation Practice--overhead

Activity #3: How Much Paint Will You Need? Handout A
              How Much Paint Will You Need? Handout B
              How Much Paint Will You Need? Handout C
Target Vocabulary

Nouns:
circumference  depth  dimension  front  height
perimeter  rear  side  surface  surface area
view  width

Verbs:
add  divide  equal  subtract

Adjectives:
acrylic  deep  enamel  high  latex
oil-based  water-based  wide
Laying the Foundation
Warm-Up / Presentation

Actions

1. Place the Lost in the Paint Aisle Overhead on the OHP. Discuss the picture using at least some of the following questions as prompts.

   Y Where is this man?
   Y Why is he there?
   Y What is he feeling or thinking?
   Y Have you ever felt like the man in this picture?
   Y If you need paint, where do you go to buy it?
   Y What kind of paint were you looking for?
   Y Where was it?
   Y Was it easy to find?
   Y Has anyone ever bought the wrong paint?
   Y What happened?
   Y Can you return paint to the store if you don’t like it?

Explain that many people find buying paint in these big home improvement stores a little confusing because there are so many kinds of paint to choose from. To buy the right paint, you need to read the paint can labels carefully.

Materials

Lost in the Paint Aisle–Overhead

Activity #1: Reading Paint Labels

1. Distribute the Paint On Sale Handout to each learner. Hold up a real paint can and, pointing to the label, explain that the label usually has all the information they need to choose a paint. Draw a chart on the board with six columns. Read the title above each column and, if possible, have learners explain the meaning. Use the gloss strip examples from the color palette to remind learners of the meaning of gloss and finish.

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Place to Use</th>
<th>Surface Finish</th>
<th>Contents</th>
<th>Special Use?</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sherwin Williams</td>
<td>Interior</td>
<td>Semi-gloss</td>
<td>Latex</td>
<td>-----</td>
<td>Blue</td>
</tr>
</tbody>
</table>
### Actions

2. Tell the learners that they will be working with their groups to read the labels of the cans in the **Handout** and decide where each word would go in the chart. Explain that not every paint label has all of the information to go in the chart.

3. Do an example with the whole group, using the label on the paint can (the real one) in front of you. Ask for volunteers to tell you where each words fits in the chart. Write the word in the correct column on the board. Have learners work in small groups to read the labels from the **Handout** and write the words in the correct columns in the chart. Optionally, groups may refer to real paint can labels. While the other groups are working together, assist the beginner group in reading the labels and completing the chart.

Note: You will want to explain that *alkyd* paint is the most common form of *oil-based* paint.

4. After most groups have filled out the columns on their handouts, ask for volunteers to come to the board (one at a time) and write the words in the columns for one paint label. Tape the picture of the can next to the row of words from its label. Your chart will look something like the example.

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Place to Use</th>
<th>Surface Finish</th>
<th>Contents</th>
<th>Special Use?</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sherwin Williams</td>
<td>Interior</td>
<td>Semi-Gloss</td>
<td>Latex</td>
<td>---</td>
<td>Blue</td>
</tr>
<tr>
<td>Glidden</td>
<td>Interior</td>
<td>Flat</td>
<td>Enamel Oil-Based</td>
<td>Porch</td>
<td>White</td>
</tr>
<tr>
<td>Zinsser</td>
<td>Exterior</td>
<td>High-Gloss</td>
<td>Oil-Based</td>
<td>Ceiling</td>
<td>Base 1</td>
</tr>
<tr>
<td>Behr</td>
<td>Int/Ext</td>
<td>Satin</td>
<td>Acrylic</td>
<td>Base</td>
<td>---</td>
</tr>
<tr>
<td>Behr</td>
<td>Int/Ext</td>
<td>Semi-Gloss</td>
<td>Water-Based</td>
<td>Base</td>
<td>---</td>
</tr>
<tr>
<td>Behr</td>
<td>Int/Ext</td>
<td>Eggshell</td>
<td>Latex</td>
<td>Base</td>
<td>---</td>
</tr>
</tbody>
</table>

- **Manufacturer**
- **Place to Use**
- **Surface Finish**
- **Contents**
- **Special Use?**
- **Color**

5. After volunteers have written the terms in the columns for five or six paint labels, point to the **Surface Finish** or **Gloss** column.
### Actions

Ask learners to tell you how to list these words in order of the degree of glossiness. Make a new list of the finish types, in order of glossiness. You will write this list on the board:

- flat, matte, eggshell, satin, semi-gloss, high-gloss

Note: Some paint companies have an additional finish, *sateen*, which falls between satin and semi-gloss.

### Materials

6. In the **Contents** category, ask the learners to tell you which words refer to the same general type of paint. After the learners have responded, draw a circle around *enamel* and *oil-based* in one color marker and then another circle around *acrylic, water-based* and *latex* in another color marker. (See example chart above.) Ask learners to tell you an important difference between these two types of paint. Write their correct responses on the board. Ask learners what type of paint, *oil* or *latex*, they prefer to use and why.
## Actions

### Activity #2: Calculating Paint Surfaces

1. Tell learners that after choosing the paint colors and sheen, the next important step in a paint project is to calculate how much paint you need. Explain that in this part of the lesson they will learn and practice the steps in calculating the number of gallons of paint a painter needs for each job.

2. Have learners get into groups of three. Give each learner the *Paint Calculation Practice Handout*. Read the terms for the dimensions of a structure and have the learners repeat each word after you.

3. Check that all learners understand the meanings of the terms and their use in the illustrations on the *Handout*.

4. Tell the learners to look at the instructions for calculating paint area on the *Paint Calculation Practice Handout*. Have several strong readers read the instructions, each taking one step to read. Be sure that the learners are placing the stress on the correct syllables in words such as *perimeter*, *circumference*, *dimensions*, and *multiply*. If learners have difficulty doing this, tap the stress pattern on the table as you say each word, and then have the learners do the same.

5. Ask learners to individually calculate each step and then check their answers with the other members. Ask for volunteers to tell you the correct result for each step and write that number in the correct blank in the transparency. Ask higher level group members explain their correct answers to any members that need further clarification.

6. Have groups complete the calculations for the painted surface area and number of gallons in *Practice B* on the *Paint Calculation Practice Handout*. Circulate to assist where needed.

## Materials

- *Paint Calculation Practice Handout*
Building on the Foundation
Practicing the New Language

<table>
<thead>
<tr>
<th>Actions</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activity #3: Estimating Gallons of Paint</strong></td>
<td><strong>How Much Paint Will You Need?</strong></td>
</tr>
<tr>
<td>Match learners at the same language level to work together in pairs. Give each pair a version of the How Much Paint Will You Need? Handout, A for beginning learners, B for mid-level learners, and C for higher level learners. Have the pairs follow the steps they practiced in Activity #2 to determine the estimated number of gallons of paint they will need to paint the interior of the house pictured in their handout.</td>
<td><strong>Handout A</strong></td>
</tr>
<tr>
<td><strong>Optional Extension: Explaining Calculations:</strong> Have each pair find a second pair with a different house example to form a new group. Each pair should sit directly across from the other. Referring to the picture of their houses, each pair will explain their calculations to the other pair. One partner explains Steps 1-3 and the other partner explains Steps 4-6. After each pair has finished their explanation, the learners in the other pair can ask questions and make suggestions or other comments. Circulate to assist groups as needed. As a whole group, discuss any questions or comments learners have.</td>
<td><strong>How Much Paint Will You Need?</strong></td>
</tr>
<tr>
<td><strong>Handout B</strong></td>
<td><strong>Handout C</strong></td>
</tr>
</tbody>
</table>
## Finishing Work
### Extension or Out-of-Class Practice

<table>
<thead>
<tr>
<th>Actions</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Learners can practice calculating the square footage to paint for other house plans they find at the same e-plan sites listed on their copy of the How Much Paint Will You Need? Handout.</td>
<td>How Much Paint Will You Need? Handout</td>
</tr>
<tr>
<td>2. Learners can ask a salesperson at a local paint store to demonstrate the use of an electronic paint calculator.</td>
<td></td>
</tr>
<tr>
<td>3. Learners calculate the number of gallons of paint needed to paint the walls of rooms in their homes that they would like to paint.</td>
<td></td>
</tr>
</tbody>
</table>
Painting
Lesson Three: Buying Paint

Facilitator Materials
### Activity #1: Reading Paint Labels

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Place to Use</th>
<th>Surface Finish</th>
<th>Contents</th>
<th>Special Use?</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Old Time</td>
<td>-----</td>
<td>-----</td>
<td>Alkyd Enamel</td>
<td>Porch &amp; Floor</td>
<td>Richmond Red</td>
</tr>
<tr>
<td>Renewal</td>
<td>Exterior</td>
<td>-----</td>
<td>Latex</td>
<td>Floor</td>
<td>Annapolis Blue</td>
</tr>
<tr>
<td>Old Time</td>
<td>Exterior</td>
<td>-----</td>
<td>Water-Based</td>
<td>Primer</td>
<td>White</td>
</tr>
<tr>
<td>Cover All</td>
<td>-----</td>
<td>-----</td>
<td>Alkyd</td>
<td>Primer</td>
<td></td>
</tr>
<tr>
<td>In Style</td>
<td>Exterior</td>
<td>Semi-Gloss</td>
<td>Latex</td>
<td>-----</td>
<td>White</td>
</tr>
<tr>
<td>Express Yourself</td>
<td>Interior</td>
<td>Flat</td>
<td>Latex</td>
<td>-----</td>
<td>Salmon</td>
</tr>
<tr>
<td>Clean + Bright</td>
<td>Interior</td>
<td>Satin</td>
<td>-----</td>
<td>Mildew Proof</td>
<td></td>
</tr>
<tr>
<td>Like New</td>
<td>Interior</td>
<td>Flat</td>
<td>-----</td>
<td>Ceiling Paint</td>
<td>Bright White</td>
</tr>
<tr>
<td>American Heritage</td>
<td>Interior</td>
<td>Satin</td>
<td>Acrylic</td>
<td>Wall and Trim</td>
<td></td>
</tr>
<tr>
<td>Renewal</td>
<td>Interior</td>
<td>Semi-Gloss</td>
<td>Acrylic Enamel</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td>Cover All</td>
<td>Exterior</td>
<td>Satin</td>
<td>-----</td>
<td>House and Trim</td>
<td>Capital Grey</td>
</tr>
<tr>
<td>New Home</td>
<td>-----</td>
<td>High Gloss</td>
<td>Enamel</td>
<td>Metal &amp; Wood</td>
<td>Shenandoah Green</td>
</tr>
<tr>
<td>Wild Tangent</td>
<td>Interior</td>
<td>Matte</td>
<td>Latex</td>
<td>-----</td>
<td>Tahiti Green</td>
</tr>
<tr>
<td>American Heritage</td>
<td>Exterior</td>
<td>Flat</td>
<td>Latex</td>
<td>Base 1</td>
<td></td>
</tr>
<tr>
<td>Clean + Bright</td>
<td>-----</td>
<td>Semi-Gloss</td>
<td>-----</td>
<td>Kitchen and Bath</td>
<td>Off White</td>
</tr>
</tbody>
</table>
Activity #2: Paint Calculation Practice

Practice A Instructions

To find out how much paint you need to paint the exterior of a structure, you need to know the **dimensions** of the structure. These are the **width**, the **depth**, and the **height** of the structure.

![Diagram of a house with dimensions labeled]

**Sample Dimensions**

<table>
<thead>
<tr>
<th>Width</th>
<th>55'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth</td>
<td>30'</td>
</tr>
<tr>
<td>Height</td>
<td>38'</td>
</tr>
</tbody>
</table>

**Step 1**  Add the width and depth of the four sides of the structure to get the **perimeter** or the circumference of the structure.

\[
\text{front width} + \text{right depth} + \text{back width} + \text{left depth} = \text{perimeter or circumference}
\]

\[
55' + 30' + 55' + 30' = 170'
\]

**Step 2**  Multiply the **perimeter** by the height of the structure to get the **total surface area** of the outside walls you will paint.

\[
170' \times 38' = 6460 \text{ sq ft}
\]

**Step 3**  Count the **standard windows**. Multiply this number by 15 sq ft.

Count the **large windows**. Multiply this number by 21 sq ft.

Count the **single doors**. Multiply this number by 25 sq ft.

Count the **double doors**. Multiply this number by 40 sq ft.
Non-painted area in sq ft

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>standard windows</td>
<td>4 x 15 sq ft</td>
<td>= 60</td>
</tr>
<tr>
<td>large windows</td>
<td>4 x 21 sq ft</td>
<td>= 84</td>
</tr>
<tr>
<td>single doors</td>
<td>2 x 25 sq ft</td>
<td>= 50</td>
</tr>
<tr>
<td>double doors</td>
<td>1 x 40 sq ft</td>
<td>= + 40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-painted area in sq ft</td>
<td></td>
<td>= 234</td>
</tr>
</tbody>
</table>

Step 4  **Add** the number of square feet for all of the windows and doors.

Step 5  **Subtract** the **total number of square feet of non-painted areas** from the **total surface area** that you will paint.

Total Surface Area       6460 sq ft
Non-painted Area         - 234 sq ft
Paint Surface Area       6226 sq ft

Step 6  **Divide** the paint surface area **by 400 sq ft**. (One gallon of paint covers about 400 sq ft.)

\[
400 \sqrt{6226}
\]

Number of gallons of paint needed: **15.5** gal
Practice B Instructions

Do this practice together with your group.

Step 1  Add the width and depth of the four sides of the structure to get the perimeter or the circumference of the structure.

\[
\text{front width} + \text{right depth} + \text{back width} + \text{left depth} = \text{perimeter or circumference}
\]

\[81 \text{ ft} + 52 \text{ ft} = 266 \text{ ft}\]

Step 2  Multiply the perimeter by the height of the structure to get the total surface area of the outside walls you will paint.

\[266 \text{ ft} \times 21 \text{ ft} = 5586 \text{ sq ft}\]

Step 3  Count the standard windows. Multiply this number by 15 sq ft.

Count the large windows. Multiply this number by 21 sq ft.

Count the single doors. Multiply this number by 25 sq ft.

Count the double doors. Multiply this number by 40 sq ft.
### Unpainted area in sq ft

<table>
<thead>
<tr>
<th>Standard windows (left side)</th>
<th>8x15 sq ft = 120</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large windows (right side)</td>
<td>2x21 sq ft = 42</td>
</tr>
<tr>
<td>Single doors (right side)</td>
<td>1x25 sq ft = 25</td>
</tr>
<tr>
<td>Double doors (front and back)</td>
<td>2x40 sq ft = 80</td>
</tr>
</tbody>
</table>

Unpainted area in sq. ft 267

**Step 4** Add the number of square feet for all of the windows and doors.

**Step 5** Subtract the total number of square feet of unpainted areas from the total surface area that you will paint.

<table>
<thead>
<tr>
<th>Total Surface Area</th>
<th>5586 sq ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unpainted Area</td>
<td>- 267 sq ft</td>
</tr>
<tr>
<td>Paint Surface Area</td>
<td>5319</td>
</tr>
</tbody>
</table>

**Step 6** Divide the paint surface area by 400 sq ft. (One gallon of paint covers about 400 sq ft.)

\[ 400 \sqrt{5319} \]

Number of gallons of paint needed: 13.3 gal
Activity #3: How Much Paint Will You Need?

Handout A

House #1 “Simply the Best”

Plan HWEPL06999
http://www.eplans.com
Used with permission from eplans.com
Instructions: Estimate the number of gallons of paint you will need to paint the walls in these rooms. The ceiling height in these rooms is 9.0 ft.

- the three bedrooms
- the dining room
- the foyer

<table>
<thead>
<tr>
<th>Room</th>
<th>Total room area in sq ft</th>
<th>Unpainted areas in sq ft</th>
<th>Room area to be painted in sq ft</th>
<th>Number of gallons needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedroom #1*</td>
<td>558</td>
<td>85</td>
<td>473</td>
<td>1.2</td>
</tr>
<tr>
<td>Bedroom #2</td>
<td>420</td>
<td>55</td>
<td>365</td>
<td>.9</td>
</tr>
<tr>
<td>Bedroom #3</td>
<td>456</td>
<td>95</td>
<td>361</td>
<td>.9</td>
</tr>
<tr>
<td>Foyer</td>
<td>342</td>
<td>90</td>
<td>252</td>
<td>.6</td>
</tr>
<tr>
<td>Dining room</td>
<td>384</td>
<td>95</td>
<td>289</td>
<td>.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total gallons</td>
<td>4.3</td>
</tr>
</tbody>
</table>

*See Facilitator Notes on next page for detailed solving information and special considerations.
Facilitator Notes

**Bedroom #1**  (Master Bedroom)
Perimeter: $14 + 17 + 14 + 17 = 66$ ft x 9' ceilings = 558 sq ft surface area (Total room area)
4 windows x 15 sq ft = 30 sq ft *There are a variety of ways to address the alcove in the bottom left corner of the master bedroom. The simplest, used here, is to count the bottom corner of the bedroom as solid (do not subtract the main door). The "extra paint" can be used for the alcove walls.
1 single door x 25 sq ft = 25 sq ft
Unpainted areas = 85 sq ft
558 - 85 = 473 sq ft (Room area to be painted) 473/400 = 1.1825 or 1.2 gallons of paint needed**

**Bedroom #2**  (Topmost Bedroom, Left)
Perimeter: $11 + 12 + 11 + 12 = 46$ ft *For some rooms, calculating surface area will require conversion between feet and inches (the method used throughout these notes). You may choose, especially with beginning students, to introduce the concepts of rounding and estimation. Students could round 46 ft to 47 feet, resulting in a Total room area of 423 sq ft. For closer estimation, be sure to tell students to round after adding the perimeter (46 becomes 47; rather than 11 becomes 11, giving a perimeter of 46 and a Total room area of only 414 sq ft.) Rounding will result final answers slightly different from those given in the preceding chart.
12" x 12" = 144" per square foot
46, 480 / 144 = 420 sq ft (Total room area) 
2 windows x 15 sq ft = 30 sq ft
1 single door x 25 sq ft = 25 sq ft
1 double door x 40 sq ft = 40 sq ft
Unpainted areas = 95 sq ft
420 - 95 = 325 sq ft (Room area to be painted) 325/400 = .8125 or .8 gallons of paint needed**

**Bedroom #3**  (Lower Bedroom, Bottom Left Corner)
Perimeter: $13 + 11 + 13 + 11 = 48$ sq ft $= 50$ ft x 108" ceilings = 65,664 in$^2$ = 456 sq ft (Total room area)
2 windows x 15 sq ft = 30 sq ft
1 single door x 25 sq ft = 25 sq ft *Be sure learners remember to include closet doors in their calculations.
1 double door x 40 sq ft = 40 sq ft
Unpainted areas = 95 sq ft
456 - 95 = 361 sq ft (Room area to be painted) 361/400 = .9025 or .9 gallons of paint needed**

**Foyer**
Perimeter: $7 + 11 + 7 + 11 = 36$ ft x 9' ceilings = 342 sq ft surface area (Total room area)
2 single doors x 25 sq ft = 50 sq ft
1 double door x 40 sq ft = 40 sq ft
Unpainted areas = 90 sq ft
342 - 90 = 252 sq ft (Room area to be painted) 252/400 = .63 or .6 gallons of paint needed**

**Dining Room**
Perimeter: $14 + 11 + 14 + 11 = 40$ sq ft $= 42$ ft x 108" ceilings = 55,296 in$^2$ = 384 sq ft (Total room area)
2 windows x 15 sq ft = 30 sq ft **General Note on Rounding: Rounding to the tenth decimal point is recommended. Rounded scores will differ slightly from unrounded scores. For example, rounding to the tenth place in this activity gives a total of 4.2 gallons of paint needed, while using the unrounded decimals provided by a common hand calculator will result in a total of 4.25 or 4.2 gallons of paint needed.
1 single door x 25 sq ft = 25 sq ft
1 double door x 40 sq ft = 40 sq ft
Unpainted areas = 95 sq ft
384 - 95 = 289 sq ft (Room area to be painted) 289/400 = .7225 or .7 gallons of paint needed**
Activity #3: How Much Paint Will You Need?

Handout B

House #2 Cape Cod Charmer

Plan HWEPL00515
http://www.eplans.com
Used with permission from eplans.com
Instructions: Estimate the number of gallons of paint you will need to paint these rooms. The ceiling height in each room is 9.0 ft.

- the living room
- the three bedrooms
- the study
- the dining room

<table>
<thead>
<tr>
<th>Room</th>
<th>Total room area in sq ft</th>
<th>Unpainted areas in sq ft</th>
<th>Room area to be painted in sq ft</th>
<th>Number of gallons needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living room</td>
<td>531</td>
<td>110</td>
<td>421</td>
<td>1</td>
</tr>
<tr>
<td>Bedroom #1</td>
<td>534</td>
<td>160</td>
<td>374</td>
<td>.9</td>
</tr>
<tr>
<td>Bedroom #2</td>
<td>495</td>
<td>80</td>
<td>415</td>
<td>1</td>
</tr>
<tr>
<td>Bedroom #3</td>
<td>427^6</td>
<td>80</td>
<td>347^6</td>
<td>.9</td>
</tr>
<tr>
<td>Study</td>
<td>381</td>
<td>40</td>
<td>341</td>
<td>.9</td>
</tr>
<tr>
<td>Dining room</td>
<td>417</td>
<td>95</td>
<td>322</td>
<td>.8</td>
</tr>
</tbody>
</table>

Total gallons 5.5

*See Facilitator Notes on next page for detailed solving information and special considerations.
### Living Room
Perimeter: $12 + 17^6 + 12 + 17^6 = 59 \text{ ft} \times 9^0 \text{ ceilings} = 531 \text{ sq ft}$ (Total room area)

4 windows x 15 sq ft = 60 sq ft
2 single door x 25 ft$^2$ = 50 sq ft

Unpainted areas = 110 ft

531 - 110 = 421 sq ft (Room area to be painted)

$361/400 = 1$ gallon of paint needed**

### Bedroom #1 (Master Bedroom)
Perimeter: $12^8 + 17^2 + 12^6 + 17^2 = 49^0 = 712^0 \times 108^0 \text{ ceilings} = 76,896 \text{ in}^2 = 534 \text{ sq ft}$ (Total room area)

2 windows x 15 sq ft = 30 sq ft
2 single doors x 25 ft$^2$ = 50 sq ft
2 double doors x 40 ft$^2$ = 80 sq ft

Unpainted areas = 160 sq ft

534 - 160 = 374 sq ft (Room area to be painted)

$374/400 = .9$ gallons of paint needed**

### Bedroom #2
Perimeter: $13^8 + 13^{10} + 13^8 + 13^{10} = 52^{30} = 55 \times 9^0 \text{ ceilings} = 495 \text{ sq ft}$ (Total room area)

1 window x 15 sq ft = 15 sq ft
1 single door x 25 ft$^2$ = 25 sq ft
1 double door x 40 ft$^2$ = 40 sq ft

Unpainted areas = 80 sq ft

495 - 80 = 415 sq ft (Room area to be painted)

$415/400 = 1$ gallon of paint needed**

### Bedroom #3
Perimeter: $12^6 + 10^{10} + 12^6 + 10^{10} = 49^4 = 712^0 \times 108^0 \text{ ceilings} = 76,896 \text{ in}^2 = 427^6 \text{ sq ft}$ (Total room area)

1 window x 15 sq ft = 15 sq ft
1 single door x 25 ft$^2$ = 25 sq ft
1 double door x 40 ft$^2$ = 40 sq ft

Unpainted areas = 80 sq ft

427.5 - 80 = 347.5 sq ft (Room area to be painted)

$347.5/400 = .9$ gallons of paint needed**

### Study
Perimeter: $9^{10} + 11^4 + 9^{10} + 11^4 = 40^{30} = 42^4 = 508^0 \times 108^0 \text{ ceilings} = 54,864 \text{ in}^2 = 381 \text{ sq ft}$ (Total room area)

1 window x 15 sq ft = 15 sq ft
1 single door x 25 ft$^2$ = 25 sq ft

Unpainted areas = 40 sq ft

381 - 40 = 341 sq ft (Room area to be painted)

$341/400 = .9$ gallons of paint needed**

### Dining Room
Perimeter: $12 + 17^6 + 12 + 17^6 = 59 \text{ ft} \times 9^0 \text{ ceilings} = 417 \text{ sq ft}$ (Total room area)

4 windows x 15 sq ft = 60 sq ft
2 single doors x 25 ft$^2$ = 50 sq ft

Unpainted areas = 95 sq ft

417 - 95 = 322 sq ft (Room area to be painted)

$322/400 = .8$ gallons of paint needed**  

**General Note on Rounding: Paint gallons have been rounded to the tenth place. Rounded scores will differ slightly from unrounded scores. For example, this activity results in the round figure of 5.5 paint gallons needed, while using the unrounded decimals provided by a common hand calculator results in 5.55125, or 5.6 paint gallons needed.
Activity #3: How Much Paint Will You Need?

Handout C  House #3 Craftsman Character

Plan HWEPL09800
http://www.eplans.com
Used with permission from eplans.com
Instructions: Estimate the number of gallons of paint you will need to paint the walls in these rooms. The ceiling height in each room is 9.0 ft.

- the living room (great room)
- two bedrooms
- master bedroom
- the bedroom/study
- the dining room

<table>
<thead>
<tr>
<th>Room</th>
<th>Total room area in sq ft</th>
<th>Unpainted areas in sq ft</th>
<th>Room area to be painted in sq ft</th>
<th>Number of gallons needed</th>
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</thead>
<tbody>
<tr>
<td>Living room</td>
<td>543</td>
<td>165</td>
<td>378</td>
<td>.9</td>
</tr>
<tr>
<td>Bedroom #1</td>
<td>450</td>
<td>120</td>
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<tr>
<td>Bedroom #2</td>
<td>456</td>
<td>130</td>
<td>326</td>
<td>.8</td>
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<td>Master Bedroom</td>
<td>534</td>
<td>90</td>
<td>444</td>
<td>1.1</td>
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<tr>
<td>Bedroom/Study</td>
<td>450</td>
<td>101</td>
<td>349</td>
<td>.9</td>
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<tr>
<td>Dining room</td>
<td>486</td>
<td>156</td>
<td>330</td>
<td>.8</td>
</tr>
<tr>
<td><strong>Total gallons</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>5.3</strong></td>
</tr>
</tbody>
</table>

See Facilitator Notes on next page for detailed solving information and special considerations.
Facilitator Notes

Living Room  (Great Room)

Perimeter: $20 + 20^2 + 20^2 = 600 + 600 = 1200'' = 108''$ ceilings $= 78,192$ in$^2 = 543$ sq ft (Total room area)
4 windows $x 15$ sq ft $= 60$ sq ft
1 single door $x 25$ ft$^2 = 25$ sq ft
2 double doors $x 40$ ft$^2 = 80$ sq ft
Unpainted areas $= 165$ sq ft
543 - 165 = 378 sq ft (Room area to be painted)
$\frac{378}{400} = .9$ gallons of paint needed**

*There are a variety of approaches in deciding how to calculate the surface area of the Great Room, taking into account the openness of the design. Here, one 20' wall (the lower wall) has been left out of the calculations. Because there is, in fact, some paintable area on the lower wall, one 25 ft$^2$ door has also been left out of calculation (failing to subtract the door provides "extra paint" for the segments of the lower wall). The fireplace and the bar leading to the kitchen have been treated as 40 ft$^2$ doors. The shelves have not been included in the "Unpainted areas" calculation.

Bedroom #1  (Topmost Bedroom, Left)

Perimeter: $14 + 11 + 14 + 11 = 50$ ft $x 9'$ ceilings $= 450$ sq ft (Total room area)
2 windows $x 15$ sq ft $= 30$ sq ft
2 single doors $x 25$ ft$^2 = 50$ sq ft
1 double door $x 40$ ft$^2 = 40$ sq ft
$\frac{450 - 120}{400} = .8$ gallons of paint needed**

Bedroom #2  (Lower Bedroom, Left)

Perimeter: $14 + 11 + 14 + 11 = 50'' = 608'' x 108''$ ceilings $= 65,664'' = 456$ sq ft (Total room area)
2 windows $x 15$ sq ft $= 30$ sq ft
4 single doors $x 25$ ft$^2 = 100$ sq ft
$\frac{495 - 80}{400} = 1$ gallon of paint needed**

Master Bedroom

Perimeter: $13 + 16 + 13 + 16 = 58'' = 59'' = 712'' x 108''$ ceilings $= 76,896$ in$^2 = 534$ sq ft (Total room area)
2 single door $x 25$ ft$^2 = 50$ sq ft
1 double door $x 40$ ft$^2 = 40$ sq ft
Unpainted areas $= 40$ sq ft
$\frac{534 - 90}{400} = 1.1$ gallons of paint needed**

*There are a variety of ways to approach this bedroom's convergence with the sitting room. You may want to teach advanced learners how to subtract the dimensions of the sitting room dimensions from the left and upper walls of the bedroom. In these calculations, the sitting room has been ignored; the left corner of the bedroom is treated as paintable area. Another alternative is to estimate the missing corner. For example, estimating the missing area to be approximately the area of three double doors would yield an Unpainted areas total of 210 sq ft, with room area to be painted 324 ft, or .8 gallons. This would impact the overall totals, yielding a final result of 5 rather than 5.3 gallons of paint needed.
Bedroom/ Study

Perimeter: 12 + 13 + 12 + 13 = 50 ft x 9' ceilings = 450 sq ft (Total room area)
2 windows x 15 sq ft = 30 sq ft
1 large window x 21 ft² = 21 sq ft 2
single door x 25 ft² = 50 sq ft
Unpainted areas = 101 sq ft
450 - 101 = 349 sq ft (Room area to be painted) 349/400 = .9 gallons of paint needed**

Dining Room

Perimeter: 12 + 15 + 12 + 15 = 54 ft x 9' ceilings = 486 sq ft (Total room area)
2 windows x 15 sq ft = 30 sq ft
1 large window x 21 ft² = 21 sq ft 1
single door x 25 ft² = 25 sq ft 2
double doors x 40 ft² = 80 sq ft
Unpainted areas = 156 sq ft
486 - 156 = 330 sq ft (Room area to be painted) 330/400 = .8 gallons of paint needed**

**General Note on Rounding: Paint gallons have been rounded to the tenth place. Rounded scores will differ slightly from unrounded scores. For example, this activity results in the round figure of 5.3 paint gallons needed, while using the unrounded decimals provided by a common hand calculator results in 5.3925 or 5.4 paint gallons needed.