# Consumer Economics
# Scale Drawing

**CASAS Competencies:**
- 1.1.4 Select, compute, or interpret appropriate standard measurement for length, width, perimeter, area, volume, height, or weight.

**Outcomes:**
- Learners will identify appropriate measurement to use for a scale drawing
- Learners will use a fraction/foot scale to complete a table
- Learners will add and subtract fractions

**Teacher prep and materials:**
- Transparencies and class copies of Handout 1: Group Practice
- Transparencies and class copies of Handout 2: Pair Practice
- Class copies of Handout 3: Individual Assessment
- 4 blank transparencies and 4 pens
- Set of class rulers
- Maps with different scales

## *Why?*

**Warm up:**
Put several maps on the tables, and ask students to find St. Paul or other designated city on their map. Then ask them how they can find the distance from one city to another, using only the map. Have them circle each scale from each map, telling each other how many miles are equivalent to 1 inch. Write the scale from each map on the board. Elicit responses for other ways to use scales (when the actual object is too big.)

## Step by Step

Do: Give each table of 4 students a map – a different map, if possible.

**Say: Look at your map at your table. Find (St. Paul). Use your ruler to measure 1 inch from (St. Paul).**

**Now find the scale at the bottom of your map. How many miles in each inch? Let's write the scales on the board.**

Write 4-5 inch/mile scale(s) from the map(s).

**Now tell me how far a city is that is about 2 inches from (St. Paul)? 3 inches from (St. Paul)? Each table will use the scale found on their map.**

Write the measurements given to you on the board.

## *What?*

**Presentation:**

Introduce the concept of “scale” on a building drawing. Why do we need a scale when looking at the picture of a real building? How will we use it? Have four students contribute to a collective drawing of a building, but assign them only part to draw and have them do it on separate blank transparencies: assign one student to draw the roof, another to draw the windows, a third to draw the sides of the house and a four to draw the door. Place all transparencies on top of one another and discuss the varying dimensions on the completed drawing. If we don’t use the same scale, the drawing won’t turn out right.

**Step by Step**

**Say: I’m going to give 4 students a transparency and a pen. They will each draw part of a house, but they won’t be able to see each other’s paper. Student 1 will draw a roof, student 2 will draw a window, student 3 will draw a door, and student 4 will draw the 4 sides of a house.**

Do: Allow a few minutes for the students to finish.

**Ok, come on up to the front and show us your pictures. Let’s put each drawing on top of the other.**

**What do you think?**

Discuss possible answers, such as, “the windows are bigger than the door, the door is bigger than the roof, the house is smaller than the window”, etc.

**The pieces of the house don’t fit together like a real house, because we didn’t use a scale measurement to draw the pieces.**

## *Do!*

**Controlled Practice:**
Students look at Handout 1: Group Practice, a picture of a barn. The teacher highlights the barn door on transparency of Handout 1. The students estimate the width of barn door, then measure with a ruler. The class generates ideas of how we can find the actual width when the scale width is less than 1 inch.

**Step by Step**
Do: Give each student a copy of Handout 1. On the overhead, highlight the barn

door.

**Say: Look at this barn. What is the scale? That's right, every inch equals 32 feet. On the overhead, look at the square I have highlighted. This is the barn door we are going to measure. Before we measure, let's read Example # 1 under the drawing.**

Ask the students to read and estimate the barn door. Elicit responses.

**Now measure the width of the barn door with your ruler.**

Elicit: It's ½ inch wide.

**The width of the barn door in this drawing is ½ inch long. This means if you measured the width of the actual door on this building, it would measure 16 feet. How do we know? How do we find ½ of a number?**

**What is ½ of 10? _____**
**How do we find that number?**

**What is ½ of 50?_____**
**How do we find that number?**

**Yes, we divide by 2 to find ½ of a number. So 32 divided by 2 equals 16.**

Show the division for each on the board.

**Now we are going to look at the roof length. First, estimate what you think is the length of the roof of the barn. Then measure the length with your ruler.**

Highlight the roof length to be measured. Each student measures the barn roof.

**What is the length of the roof? Yes, it's 1 inch. So the actual roof length is 32 feet.**

**How do we find that number? The scale tells us that 1 inch equals 32 feet.**

**Pair Practice:** Read the summary paragraph on Handout 2: Pair Practice. Using the chart for scale comparisons, ask the students to fill in the scale information that we now know from measuring the barn door. The give the direction to finish the chart with their assigned partners.

**<u>Step by Step</u>**

Do: Give each group of 2 students a copy of Handout 2: Pair Practice.

**Say: Let's read the following paragraph together:**

**When the drawing measurement is *less than one inch*, the measurement on the building is *less than 32 feet*. When the drawing measurement is *more than one inch*, the measurement on the building is *more than 32 feet*. When the measurement on the drawing is *equal to one inch*, the measurement on the building *is equal to 32 feet*.**

**Working with a partner, fill in the chart. What information do we already know? Yes, we can fill in the ½ inch equals 16 feet. Now finish the chart.**

Give students 20 minutes to complete this page.

**OK, let's fill in the chart on the overhead together.**

Ask for volunteers to come to the overhead and write the missing information.
**Say: Some were easy, but how did you find ¾ inch?**

Elicit: We could add ½ inch to ¼ inch to equal ¾ inch, or 8 feet plus 16 feet equals 24 feet.

**Great! And how do we figure 112 feet on the scale?**

Elicit: We can divide 112 by 32 to get 3 with a remainder of 16, and change it to 3 ½ inches.

## *So What?*

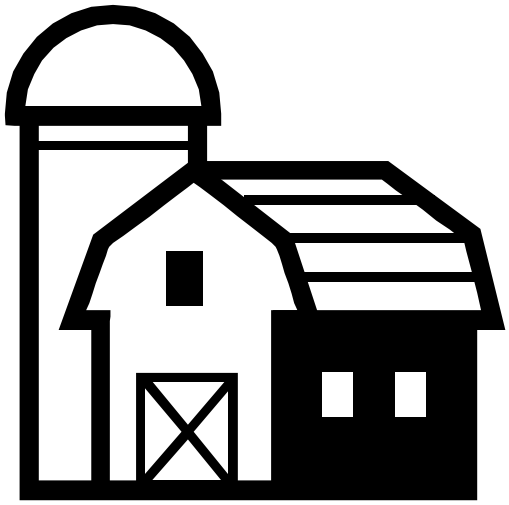
**Assessment:** Each student will now work alone on Handout 3: Individual Assessment, choosing A, B, C, or D. Correct answers: 1/A, 2/C, 3/D

**<u>Step by Step</u>**
**Say: Using what you have learned, I'm going to give each of you your own copy of the barn. Answer the questions, using the new scale: 1 inch = 15 feet.**

Do: Give each learner a copy of Handout 3: Individual Assessment.

**Follow up:**
Have students draw their "dream house" and choose a scale to use. They should do the measurements of the interior room sizes, as well as an exterior view. Share the results in class.

Handout 1: Group Practice



Look at the drawing of this barn.

**Scale 1 inch = 32 feet**

**This scale measurement is used to represent the actual measurements of this barn.**

Example 1:

Can you estimate (guess) how wide in inches the barn door is?

_____

Now, using a ruler, can you measure how wide in inches the barn door is?

_____

1 inch on this picture = 32 feet.

**The scale measurement of the barn door would be ½ inch = 16 feet.**

Handout 2: Pair Practice

**When the drawing measurement is *less than one inch*, the measurement on the building is *less than 32 feet*. When the drawing measurement is *more than one inch*, the measurement on the building is *more than 32 feet*. When the measurement on the drawing is *equal to one inch*, the measurement on the building *is equal to 32 feet*.**

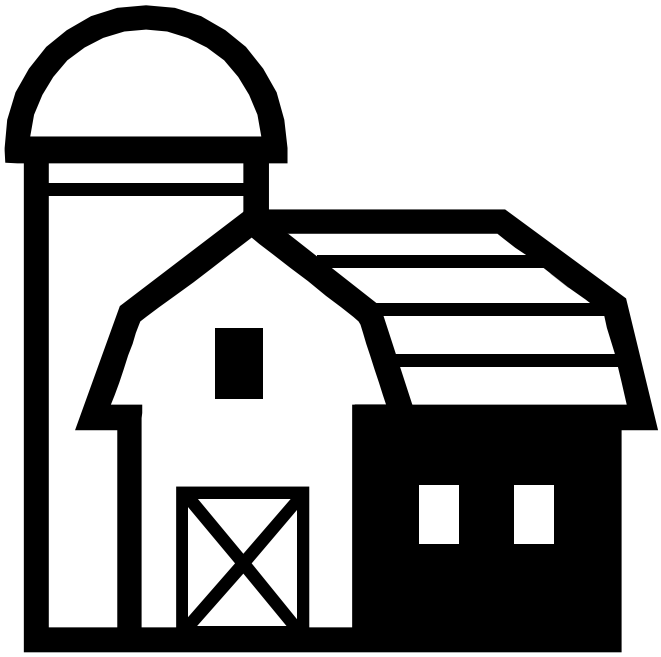
Using the scale, **1 inch = 32 feet**, fill in the chart.

| | | | | | |
|---|---|---|---|---|---|
| 1/4 inch | ____ inch | 3/4 inch | 1 inch | _____ inches | 6 inches |
| ____ feet | 16 feet | _____ feet | 32 feet | 112 feet | _____ feet |

Write an equation to show how you and your partner found how many feet would equal ¼ inch.

Write an equation to show how you and your partner found how many inches equal to 112 feet.

Handout 3: Individual Assessment



**Scale 1 inch = 15 feet**

1. According to the scale drawing, how many inches will represent 75 feet?

A. 5 inches
B. 7 inches
C. 6 inches
D. 4 inches

2. According to the scale drawing, how many inches will represent 165 feet?

A. 10 feet
B. 8 feet
C. 11 feet
D. 13 feet

3. If something on the drawing is 2 ½ inches long, how many feet long will it be in the actual barn?

A. 25 - 30 feet
B. 16 - 25 feet
C. 10 - 20 feet
D. 35 - 40 feet