Overview: Students use their knowledge about vegetation, fuels, and fire behavior to develop some rules that can help people protect their homes from wildland fire. Then they apply their rules to assessment of photos of wildland homes, ask how “firewise” the homes are, make recommendations to the home owners, and justify their recommendations.

Goal: Based on an understanding of wildland fire, students can assess how well homes are protected from fire and recommend ways to improve the homes’ protection from fire.

Objectives: Students can:

- assess the fire hazards on and around homes in wildland settings.
- recommend steps to improve their protection from wildland fire.
- give reasons for their recommendations based on their understanding of wildland fire.

### Standards:

<table>
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<th>Subjects</th>
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<th>3rd</th>
<th>4th</th>
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### Subjects: Science, Reading, Writing, Speaking and Listening, Health

### Duration: one class period

### Group Size: Whole class

### Setting: Indoors

### Vocabulary: firewise
**Teacher background:** This activity challenges students to apply their knowledge about fire science to a real-world problem – the safety of homes that are adjacent to or mixed in with wildlands. While the activity helps students integrate and apply their knowledge about fire, it is no substitute for a thorough assessment of home safety. The Firewise website [https://www.nfpa.org/Public-Education/By-topic/Wildfire](https://www.nfpa.org/Public-Education/By-topic/Wildfire) (produced by the National Fire Protection Association) provides excellent materials for that purpose. All photos in this activity were obtained from the Firewise homepage.

Here are the main Firewise questions and associated fire behavior principles that apply to the photos used in this activity:

- **Are there any ways that a surface fire could spread from the edge of the forest right up to the home? Why does it matter?** Surface fires need continuous fuels for spread, and they spread especially well in fine surface fuels. It is harder to burn wet fuels than dry fuels. It is harder to burn green fuels than dead (and dry) fuels.

- **Are there any places where an ember blown on the wind could land on or under something burnable and then start the home on fire? Why does it matter?** Fires need fuels... heat rises, so a smoldering ember under a deck or eave is dangerous.

- **Are there ladder fuels at the base of trees near the house or trees arching over the house? Why does it matter?** Heat rises... embers can fly and branches can fall from a burning tree crown.

- **Do you think the road is wide enough and good enough for a fire engine to get to the house?** This point is not likely to emerge from their study of fire science, but it is surely worth bringing out in discussion.

**Materials and Preparation:**

- Download and project **E16_FirewiseHomes1.pptx**. This presentation contains photos of 4 homes for class discussion. If you want additional material, download **E16_FirewiseHomes2.pptx**, which has another 8 photos. The slides are shown in the Appendix at the end of this lesson.

- Make copies of **Handout E16-1: Work to do on this home?** for half of the class, and copies of **Handout E16-2: Work to do on this home?** for the other half.
Procedure:

1. Write on the left side of the board: “Many wildland ecosystems need fire.” Write on the right side: “Wildland fire can hurt people and destroy homes.”

2. Ask: If you think the statement on the left is true, stand up. Regardless of how many students stand up, have some discussion on this point. Ask for specific examples of organisms that need fire. Then have students sit down.

3. Ask: If you think the statement on the right is true, stand up. Have a short discussion about this point, if needed. Then have students sit down.

4. Explain: These two things are both true, but they also create a problem. What can we do with wildland fire? What should we do? What do you suggest? Discussion. Have students explain why they do or do not want fire, who might benefit and who might suffer from having more or less wildland fire, what might be done to reduce risk. Try to get to the idea that people can take action to reduce the risk of injury or damage to their homes from wildland fire.

5. Let’s list some ways to protect a house and property from wildland fire. These are called “firewise” practices. In the middle of the board, write “Firewise Rules.” For each suggestion, get an explanation of why it should reduce risk based on students’ understanding of fire and fuels. If the suggested rule and rationale are valid, list it on the board. This table shows some examples:

<table>
<thead>
<tr>
<th>What to do:</th>
<th>Why it works!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keep litter and dead branches and other burnable stuff cleaned off the roof and porch and anyplace else next to the house.</td>
<td>An ember could ignite any of these fuels and then spread to the whole house.</td>
</tr>
<tr>
<td>Safe driveway</td>
<td>The driveway needs to be wide and clear so a fire engine can get to the house.</td>
</tr>
<tr>
<td>Limit surface fuels (vegetation)</td>
<td>Vegetation near the house creates opportunities for embers to catch and fire to spread.</td>
</tr>
<tr>
<td>No Trees overhanging house</td>
<td>Trees that overhang the house can drop burning branches onto the roof. They could also fall and break through the roof!</td>
</tr>
<tr>
<td>Green lawn</td>
<td>Moist fuels are unlikely to ignite and spread fire.</td>
</tr>
</tbody>
</table>
6. Explain: Now let’s apply our rules to some homes that are right next to wildlands or mixed in with wildland fuels. We’ll decide what makes these homes wise to fire – or firewise - and what could be improved.

7. Replace the statements to left and right of your rules on the board with: “Good job!” and “Needs work.”

8. Explain: For each photo, we’ll list firewise practices under “Good job!” and things that the home owner should work on under “Needs work.”

9. Go through *E16_FirewiseHomes1.pptx*. With each photo, ask students to apply their firewise rules to the home. Add to or change the rules if appropriate. List their thoughts under “Good job!” and “Needs work”:

   **Slide 1**
   
   **How firewise are these homes?**
   
   **Good job!** Screened in porch is good, wide driveway is good, green grass is good.
   
   **Needs work:** Clean the roof, get the duff out from base of trees, remove some trees from back of house, make sure area under steps is free of burnables. Replace wooden latticework under porch with impermeable surface.

   **Slide 2**
   
   **Good job!** Roof looks clean, there’s little vegetation next to house, there are no trees overhanging the house.
   
   **Needs work:** Replace wood shake roof, rake needles from under trees.

   **Slide 3**
   
   **Good job!** House has a clean roof, there’s little vegetation next to house, there are no trees overhanging house, there’s a green lawn.
   
   **Needs work:** Water the lawn a little more.

   **Slide 4**
   
   **Good job!** Screened in porch is good, wide driveway is good, green grass is good.
   
   **Needs work:** Clean the roof, get the duff out from base of trees, remove some trees from back of house, make sure area under steps is free of burnables. Replace wooden latticework under porch with impermeable surface.
10. If you want to evaluate more photos, use $E16\_FirewiseHomes2.pptx$, shown in the Appendix at the end of this lesson. The slides and notes are listed at the end of this activity.

11. Ask: Now that we’ve looked at some real homes, can you think of anything that should be changed in our list of firewise rules or added to it. Discussion.

12. Work with the class to turn the list of rules into a simple “Firewise home quiz,” 5 or more questions that anyone can use to evaluate a home’s protection from wildland fire. Example questions:

   a) Is the rooftop free of burnable materials, such as leaves and fallen branches?

   b) Is there a strip of unburnable material separating vegetation from the house?

   c) If there are trees and shrubs close to the house, are they short (not hanging over the roof)?

   d) Is there space between the surface fuels and the tree branches, so flames can’t get from the ground up into the tree crowns?

   e) If there is a lawn, is it kept green?

   f) Is there a road wide enough for a fire engine to get in while people are getting out?

Assessment:

1. Give each student either Handout E16-1 or E16-2.

2. Have them complete their individual handouts.

3. Then have them team up with someone who completed the other version, trade handouts, and try to improve both.
Evaluation:
Here are some points that the students should make about the two photos:

<table>
<thead>
<tr>
<th>Handout E16-1</th>
<th>Good Job!</th>
<th>Needs Work.</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>• Clean roof</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Wide gravel driveway with turnaround</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• No vegetation right next to house</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Woods near house are open, tree crowns are not continuous</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Embers can get under the deck</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Handout E16-2</th>
<th>Good Job!</th>
<th>Needs Work.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Clean roof</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Woods near house are open, tree crowns are not continuous</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Embers can get under the deck and side stairs.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Mow grass near house.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Water grass. Get it green if possible.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Can’t see any way for a fire engine to get in or out.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Worry about burning stuff rolling down the hill into all that dry grass.</td>
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</table>
Handout E16-1: Work to do on this home?

Name: _______________

1. Good job!

2. Needs work:

3. This will help because...
Handout E16-2: Work to do on this home?

Name: ______________

1. Good job!

2. Needs work:

3. This will help because...
Appendix.
Additional photos of homes for “firewise” assessment *(E16_FirewiseHomes2.pptx)*

**Slide 1**

More homes: How firewise are they?

**Slide 2**

5

*Good job!* Asphalt shingles – that’s good; they are fire resistant.

*Needs work:* Clean the roof, then the rain gutters! Prune the limbs of trees that hang over the roof.

**Slide 3**

6

*Good job!* It’s difficult to see positives from this distance and at this angle.

*Needs work:* Clear out shrubs and trees close to the house! Make sure there’s a fuel separation between house and vegetation – rock or green lawn. If that’s a shingle roof, replace it with something fire resistant or nonflammable.

**Slide 4**

7

*Good job!* Asphalt shingles – that’s good because they are fire resistant.

*Needs work:* Clean the roof! Trees seem to be hanging over the house, and limbs surround the chimney. Clear the branches away.

**Slide 5**

8

*Good job!* Trees in the area around the house have been thinned. The house looks free of clutter such as wood piles. The roof is clean and roofing material is fire resistant.

*Needs work:* Get rid of logging slash. Prune lower branches from trees, especially in back of house. Now that the area close to the house has been opened up, don’t let it get brushy or dry out. Establish and maintain green lawn.
Good job! Clever the way rocks have been used to landscape around the foundation. It looks like there’s green lawn on the other side of the sidewalk. It looks like trees in the background are spaced far apart. **Needs work:** Can’t think of anything other than maintenance.

Good job! It looks like there’s some green lawn in the foreground. **Needs work:** Are those bark chips next to the foundation? Replace them with something nonflammable, like rocks or gravel. Keep the landscaping shrubs watered and moist.

Good job! The landscaping here obviously protected the home from a severe fire. The shrubs in the margin between forest and house are dead, but the rocks under them and the green lawn kept the fire from reaching the house. It looks like the roof is asphalt shingle (fire resistant). It is likely that the home owner keeps the outside of the house clear of debris that could ignite from firebrands. **Needs work:** Hard to find anything to suggest other than maintenance.

Good job! Rock foundation for deck is a good idea. The forest is very open around the house. The house is built on a flat spot rather than on the hillside. It looks like there’s a green lawn around the house. **Needs work:** There seems to be a lot of vegetation around the deck. Reduce it or make sure it’s plants that are difficult to ignite. Burning debris could roll down the hill behind the house, so keep that area as clear of fuels as possible. If the driveway is back there, that would be good. If it’s lawn, keep it green.