Overview: In this activity the class uses their knowledge of vegetation, fuels, and fire behavior to develop guidelines for protecting homes from wildland fire. Students assess the safety of photos of wildland homes and make recommendations for home owners.

Goal: To increase students skill in applying their knowledge of wildland fire to figuring out how to protect homes from fire.

Objective:
- Students will develop guidelines for protecting homes from wildfire.
- Students can assess the hazards on and around homes in wildland settings.
- Students can recommend steps to reduce the risk of wildfire damage to homes.

Standards:

<table>
<thead>
<tr>
<th>Standards</th>
<th>6th</th>
<th>7th</th>
<th>8th</th>
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<tbody>
<tr>
<td>Common Core ELA</td>
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<tr>
<td>Writing</td>
<td>1,4</td>
<td>1,4</td>
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<tr>
<td>Speaking and Listening</td>
<td>1,2,4</td>
<td>1,2,4</td>
<td>1,2,4</td>
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<tr>
<td>Science and Technology</td>
<td>1</td>
<td>7</td>
<td>7</td>
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<td>NGSS</td>
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<td>EEEGL</td>
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<td>A,C,E,F,G</td>
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Teacher background:
This activity challenges students to apply their knowledge about fire science to a real-world problem. Please note: This activity is no substitute for a thorough assessment of a home’s protection from wildland fire. Materials for a thorough assessment are available from Firewise (http://www.firewise.org/wildfire-preparedness/teaching-tools/photo-library.aspx), a product of the National Fire Protection Association. All of the photos in this activity are from the Firewise website.

Here are the main Firewise principles and associated fire behavior concepts 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? (Surface fires need continuous fuels and spread especially well in dead, dry fuels. If there is a break in the continuity of surface fuels, a surface fire will stop.)
• 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? (Fires need fuels... Heat rises, so a smoldering ember under a deck or eave is dangerous.)
• Are there ladder fuels at the bases of trees near the house? (Heat rises... embers can fly from a burning tree crown)
• Is the access road wide enough and good enough for a fire engine to get to the house? (This is not likely to emerge from their study of fire science, but it is worth bringing out in discussion.)

Materials and Preparation
• Download and project PowerPoint M20-1_FirewiseHomes.pptx, which has 4 photos. OPTIONAL: If you want to go through 12 additional photos with the class, download PowerPoint M20-2_MoreFirewiseHomes.pptx.
• Make copies of Handout M20-1: Making the rules and using them, for half of the class, and make copies of Handout M20-2: Making the rules and using them, for the other half.

Procedure
1. Write on the left side of the board: “Ecosystems of the Sierra Nevada need wildland 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 (point to it!), raise your hand. Regardless of how many students respond, have some discussion. Ask for specific examples of organisms that need fire.
3. Ask: If you think the statement on the right is true, stand up. More discussion, if necessary.
4. Explain: These two things may both be true, but they also create a problem about what to do with fire. When we want 2 things that seem mutually exclusive, we call it a dilemma. Do we want fire or not? There are no easy solutions to this dilemma. What do you suggest? Discussion. Have students explain why various approaches might work – both in wildland management and in the care of private property and homes. Ask them to explain their reasoning based on their understanding of fire and fuels.
5. On the board, make a list with 2 columns: “Good job!” and “Needs work:” Explain: We’ll look at photos of a few homes in wildland settings. For each photo, we’ll list things that the home owner has done “right” to prevent the house from burning under “Good job!” and we’ll list things that the home owner should still work on under “Needs work.”
6. Go through PowerPoint M20-1_FirewiseHomes.pptx. With each slide, ask students to comment on features that show a “Good job!” and others that show “Needs work.” Direct discussion with questions like these, and have the students explain their reasoning:
• 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 and spread especially well in dead, 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? Why does it matter? (Heat rises... embers can fly from a burning tree crown)

• Do you see other fire hazards on the house or around it?

• Do you think the road is wide enough and good enough for a fire engine to get to the house? (Not likely to emerge from their study of fire science, but worth bringing out in discussion)

**Slides and notes from M20-1_FirewiseHomes.pptx**

Slide 1

How firewise are these homes?

Slide 2

**Good job!** -- Screened in porch is good, screening under the deck might be good to keep embers out if it was metal screening (although this should not be done with wooden lattice. Also some experts now recommend NOT doing this because the screening can trap embers), 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.
Good job! Roof looks clean, there’s little vegetation next to house, only a little surface fuels, there are no trees overhanging the house.

Needs work: Replace wood shake roof, rake needles from under trees.

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. Could remove some of the trees behind the house.

Good job! House has a clean roof and a green lawn, there’s no vegetation close to house, house has shingle roof

Needs work: Get rid of the wood latticework below deck. Make sure there’s no flammable stuff under there. Replace bark chips below deck with rocks.

7. If you want to evaluate more photos, go through PowerPoint M20-2_MoreFirewiseHomes.pptx. The slides and notes are included at the end of this activity.

Assessment:
Have each student a complete either Handout M20-1. Making the rules and using them or Handout M20-2. Making the rules and using them.
Then have them team up with someone who completed the other handout, trade handouts, and review each other’s rules (Question 1). Then have them and take on the role of a wildland fire safety inspector—re-inspecting the house and neighborhood, perhaps fine-tuning the other student’s recommendations for improvement, and recommending further improvements if necessary.

<table>
<thead>
<tr>
<th>Evaluation:</th>
<th>Complete</th>
<th>Incomplete</th>
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</thead>
<tbody>
<tr>
<td>Question #1: The five rules could include any of the</td>
<td>The five rules could include any of these, plus others: - Keep the roof clean.</td>
<td>Student did not list five rules or listed incorrect/irrational</td>
</tr>
</tbody>
</table>
- Make sure the roofing material is not flammable.
- Maintain a strip of un-burnable material between the vegetation and the house.
- If shrubs are close to the house, make them short and far apart.
- If trees are near the house, get rid of low branches.
- Keep the lawn green.
- Keep it mowed.
- Keep junk from accumulating under the deck, steps, etc. – or leaning against the foundation.
- Make sure the road is wide enough for a fire engine to get in while people are getting out.
- Make sure there’s a place big enough for it to turn around.

<table>
<thead>
<tr>
<th>Question #2a: Good Job!</th>
<th>Handout M20-1</th>
<th>Handout M20-2</th>
<th>rules.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean roof</td>
<td>- Clean roof</td>
<td>- Metal roof</td>
<td></td>
</tr>
<tr>
<td>Woods near house are open. There are some barriers to keep embers from under deck and stairs.</td>
<td>- Woods near house are open. There are some barriers to keep embers from under deck and stairs.</td>
<td>- Not many ladder fuels in front of house.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question #2b: Needs Work.</th>
<th>- Put better barriers under stairs and deck</th>
<th>- Put barriers around porch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mow and water the grass around the house</td>
<td>Clean up logs around house</td>
<td></td>
</tr>
<tr>
<td>Trees are close to house.</td>
<td>Trees are close to house.</td>
<td></td>
</tr>
<tr>
<td>Thin them out or at least prune the low branches (especially trees behind house).</td>
<td>Thin them out or at least prune the low branches (especially trees behind house).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question #2c: Why?</th>
<th>- Keep embers from under wooden parts of the house.</th>
<th>- Keep embers from under wood parts of house</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce fuels next to the house.</td>
<td>Reduce fuels around the house.</td>
<td></td>
</tr>
<tr>
<td>Keep them moist so they won’t ignite easily.</td>
<td>Keep them moist so they won’t ignite easily.</td>
<td></td>
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</tbody>
</table>

Student did not write about “good job” items that were relevant to their photograph. or correct.

Student did not write about “needs work” items that were relevant to their photograph.

Student did not write a rational response.
| Question #3a/#3b | #3a: Establish some areas that have little or no fuel, where tree crowns do not touch.  
#3b: Roads may not be wide enough or straight enough to maneuver an engine safely. It may be hard to find a specific address. Is there any place in this view where an engine could turn around? Are there blind corners where an engine going in might run into residents coming out? |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
Handout M20-1. Making the rules and using them

1. Use the “Good Job”/”Needs Work” list on the board to write five rules for improving a home’s chances of surviving a wildland fire. Write the rules so they sound like orders, such as “Do this,” “Do not do that.” This is called the “imperative voice.”
   a. _____________________________________________________________________
   b. _____________________________________________________________________
   c. _____________________________________________________________________
   d. _____________________________________________________________________
   e. _____________________________________________________________________

2. Use your five rules to evaluate the house in this photo.
   a. Good Job:
   b. Needs work:
   c. Why will the needed work improve the home’s chances of surviving a wildland fire?

3. This photo shows a neighborhood in wildland setting.
   a. List one change that would reduce the likelihood that a fire would spread through the whole neighborhood:
   b. List one problem that a fire engine crew might have in trying to protect these homes:
Handout M20-2: Making the rules and using them

1. Use the “Good Job”/ “Needs Work” list on the board to write five rules for improving a home’s chances of surviving a wildland fire. Write the rules so they sound like orders, such as “Do this,” “Do not do that.” This is called the “imperative voice.”
   a. __________________________________________________________
   b. __________________________________________________________
   c. __________________________________________________________
   d. __________________________________________________________
   e. __________________________________________________________

2. Use your five rules to evaluate the house in this photo.
   a. Good Job:
   b. Needs work:
   c. Why will the needed work improve the home’s chances of surviving a wildland fire?

3. This photo shows a neighborhood in a wildland setting.
   a. List one change that would reduce the likelihood that a fire would spread through the whole neighborhood:
   b. List one problem that a fire engine crew might have in trying to protect these homes:
More homes: How firewise are they?

**Slide 2**

- **Good job!** Asphalt shingles – nonflammable.
- **Needs work:** Clean the roof! Prune the limbs of trees that hang over the roof.

**Slide 3**

- **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.

**Slide 4**

- **Good job!** Asphalt shingles – nonflammable.
- **Needs work:** Clean the roof! Trees seem to be hanging over the house, and limbs surround the chimney. Clear the branches away.
Slide 5

**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. **Needs work:** Get rid of logging sash. Prune lower branches from trees. 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.

Slide 6

**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.

Slide 7

**Good job!** It looks like there’s some green lawn in the foreground. **Needs work:** Are those bark chips next to the foundation? That’s not a good idea. Keep the landscaping shrubs watered and moist.

Slide 8

**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.
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.