



24. Homes in the Forest: An Introduction to Firewise Practices

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 as they assess photos of wildland homes, make recommendations to the home owners, and justify their recommendations. Finally, they assess fire safety in a photo of a whole neighborhood.

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

Objectives: Students can...

- assess the fire hazards on and around homes in wildland settings.
- assess the fire hazards in neighborhoods that are embedded in wildland settings.
- recommend steps to improve home and neighborhood safety.
- give reasons for their recommendations based on their understanding of fire and fuels.

Subjects: Science, Reading, Writing, Speaking and Listening, Health

Duration: one class period

Group Size: Whole class

Setting: Indoors

Vocabulary: *firewise*

Standards:		6th	7th	8th
CCSS	Reading Informational Texts	1, 2, 4, 7, 10	1, 2, 4, 10	1, 2, 4, 10
	Writing	2, 4, 7, 10	2, 4, 7, 10	2, 4, 7, 10
	Speaking/Listening	1, 2, 4, 6	1, 2, 4, 6	1, 2, 4, 6
	Language	1, 2, 3, 4, 6	1, 2, 3, 4, 6	1, 2, 3, 4, 6
	Writing: Science/Tech	1, 2, 4, 7, 10	1, 2, 4, 7, 10	1, 2, 4, 7, 10
NGSS	Earth's Systems	ESS2.D		
	Earth and Human Activity	ESS3.A, ESS3.B, ESS3.C, ESS3.D		
	Engineering Design	ETS1.B		
EEEGL	Strand 1	A,C,E,F,G		

Teacher background: This activity challenges students to apply their knowledge about fire science to a real-world problem – the safety of homes and neighborhoods that are 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> (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 that apply to the photos used in this activity. Discussion points are provided in **Step 6** of the **Procedures** below.

- Are there any ways that a surface fire could spread from the edge of the forest right up to the home?
 - 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?
 - Are there ladder fuels at the base of trees near the house, or are there trees arching over the house?
 - Do you think the road is wide enough and good enough for a fire engine to get to the house – and then to turn around and leave?
 - Are there ways to keep a fire from spreading from a single home throughout an entire neighborhood?
-

Materials and Preparation:

- Download and project **M24_FirewiseHomes1.pptx**. This presentation contains photos of 4 homes for class discussion. If you want additional material for class discussion, download **M24_FirewiseHomes2.pptx**, which has another 8 photos. Slides and notes for the second presentation are in the **Appendix**.
- Make copies of **Handout M24-1: Making the rules and using them** for half of the class; make copies of **Handout M24-2: Making the rules and using them**, 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 a few 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, and what might be done to reduce risk. Ask them to explain their reasoning based on their understanding of fire and fuels. Try to get to the idea that people can take action to reduce the risk of injury and damage to their homes from wildland fire.**
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 under “Good job!” some things that the home owner has done “right” to prevent the house from burning, and we’ll list under “Needs work” some things that the home owner should still work on.
6. Go through **M24_FirewiseHomes1.pptx**. With each slide, ask students to comment on features that show a “Good job!” and others that show “Needs work.” Also ask if they think a fire around this home is likely to spread throughout the neighborhood. 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 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 are there 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 and a water tanker to get to the house – and then to turn around and leave? **This question is not likely to emerge from their study of fire science, but encourage students to look for practical, logistical problems like this – and to propose solutions.**
 - Can you think of ways to reduce the chances that a fire might spread from this single home throughout the entire neighborhood? **All of the principles above apply to this question. Areas with sparse or discontinuous fuels, green fuels, and fuel breaks can all help. In addition, well-marked roads and safe road access for engines and water tankers (including sufficient width or pullouts that allow evacuees to leave as fire control vehicles come in) are extremely important in protecting neighborhoods.**

Slide
1



Slide
2



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.

Neighborhood issues: It looks like trees are dense and continuous around this house. If the crowns are dry – perhaps in fall – fire could spread through the neighborhood.

Slide
3



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.

Neighborhood issues: It looks like trees in the area may be well spaced; that would be good.

pine litter is continuous throughout the neighborhood, that should be removed, probably every spring.

Slide
4



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.

Neighborhood issues: There may be a road above the house; that would be a good fuel break, although trees could be thinned a bit to reduce

crown continuity. Just hope no one lives on the steep hillside above this property – and burning debris doesn't roll downhill if a fire occurs up there.

Slide
5



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

Needs work: Replace wooden latticework under deck with impermeable surface. Make sure there's no flammable stuff under there. Replace bark chips below deck with rocks.

Neighborhood issues: It looks like trees and surface fuels uphill from the property are continuous and fairly dense, so a fire on this property could easily spread through them. In addition, if a fire occurs uphill, burning materials could roll down to the base of this house.

7. If you want to evaluate more photos, go through **M24_FirewiseHomes2.pptx**. The slides and notes are included at the end of this activity.

Assessment:

1. Give each student a copy of either **Handout M24-1** or **Handout 24-2 (Making the rules and using them)**.
2. Have them complete their individual handouts.
3. Explain: Now you will become Fire Safety Officers. Pair up with someone who completed the other handout. Trade handouts and work together to improve them so both handouts provide the BEST POSSIBLE RECOMMENDATIONS to protect the home and the neighborhood from wildland fire.

Evaluation: Here are some points that the students could make on their handouts.

Evaluation:	Complete		Incomplete
Question #1: The five rules could include any of these – and more!	<ul style="list-style-type: none"> -Keep the roof and eaves free from burnable things, like pine needles, branches, birds’ nests... -Make sure the roofing material is not flammable. -Make sure you have a strip of un-burnable stuff between the yard and the house. -If shrubs are close to the house, make them short and far apart. Avoid highly flammable species, such as juniper and pfitzer bushes. -If trees are near the house, get rid of low branches so they won’t have ladder fuels. -If trees arch over the house, trim branches that are close to the roof or likely to fall on it. -Keep vegetation around the house green. Keep grass mowed short. -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 or tanker to get in while people are getting out. Make sure there’s a place big enough for a vehicle to turn around. 		Student listed <5 rules or listed incorrect/irrational rules.
Question #2a: Good Job!	Handout M24-1 <ul style="list-style-type: none"> -Roof looks clean and nonflammable. -Woods near house are open; tree crowns are discontinuous. 	Handout M24-2 <ul style="list-style-type: none"> -Cabin might have a metal roof. -There seems to be little vegetation next to cabin. 	Student did not write about “good job” items that were correct and relevant to their photograph.
Question #2b: Needs Work.	<ul style="list-style-type: none"> -Embers can get under the deck and stuck in that structure by the side steps. -Mow grass near house. -Water grass. Get it green if possible. -Can’t see any way for a fire engine to get in or out. 	<ul style="list-style-type: none"> -Put barriers around foundation and bottom of porch so embers cannot get under there. -Clean up litter and dead logs lying near cabin. -Trees are close to cabin and lean over it. Remove some trees or at least make sure low branches are trimmed 	Student did not write about “needs work” items that were correct and relevant to their photograph.

	-Worry about burning stuff rolling down the hill into all that dry grass.	and dead branches removed from roof regularly. -There's no sign of access for vehicles to get in or out.	
Question #2c: Why?	-Heat rises, so embers under wooden parts of the house can ignite it. -Fine fuels ignite easily. -Dry fuels ignite easily.	-If flaming branches land and smolder on roof, even if the roof is metal, they could eventually ignite the beams inside. - Heat rises. Embers under wooden parts of the cabin can ignite it. -Fine fuels near the cabin will ignite easily if they are dry.	Student did not write a logical response.
Question #3a: Improve neighborhood safety.	<p>-Vegetation in both photos is continuous. In Handout 1, shrub vegetation is continuous; in Handout 2, tree crowns are continuous. Could fire suppression crews enter these areas safely?</p> <p>-Identify or establish some areas that have little or no fuel. These areas could be used to stage fire suppression equipment and also as safety zones for firefighters and residents. Make sure fire crews and residents know about these areas.</p> <p>-Consider placing cleared, open areas downhill from homes (especially important in Handout 1), since a fire moving uphill is very difficult to control.</p> <p>-Encourage residents to follow Firewise practices around their homes, in particular keeping fuels green throughout the summer.</p>		
Question #3b: Problem for fire engine crew?	The photos don't provide detailed information on roads or access. Roads may not be wide enough or straight enough to maneuver an engine or water tanker safely. It may be hard to find a specific address. Is there any place where an engine or tanker could turn around? Are there blind corners where a vehicle going in might run into residents coming out?		

Handout M24-1. Making the rules and using them

Name: _____

1. Use the “Good Job”/”Needs Work” list on the board to write 5 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 5 rules to evaluate the house in **Photo A**.

- a. Good Job:

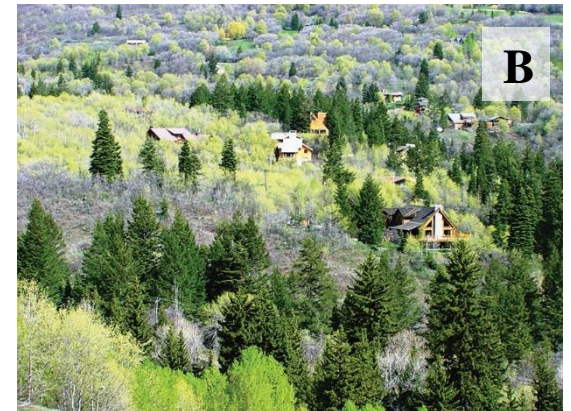
- b. Needs work:

- c. Using your knowledge of fuels and fire, EXPLAIN WHY will this work will improve the home’s chances of surviving a wildland fire:

3. **Photo B** shows a neighborhood in a wildland setting.

- a. List one change that would reduce the chances that a wildland fire would spread through the whole neighborhood:

- b. List one problem that a fire engine crew might have in trying to protect this neighborhood:



Handout M24-2: Making the rules and using them

Name: _____

1. Use the “Good Job”/”Needs Work” list on the board to write 5 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 5 rules to evaluate the cabin in **Photo A**.

- a. Good Job:

- b. Needs work:

- c. Using your knowledge of fuels and fire, EXPLAIN WHY will this work will improve the cabin’s chances of surviving a wildland fire:



3. **Photo B** shows a neighborhood in a wildland setting.

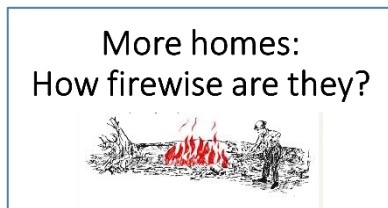
- a. List one change that would reduce the chances that a wildland fire would spread through the whole neighborhood:

- d. List one problem that a fire engine crew might have in trying to protect this neighborhood:



Appendix. Slides and notes for M24_FirewiseHomes2.pptx

Slide
1



Slide
2



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.

Neighborhood issues: This photo doesn’t give us a feel for fuels in the neighborhood.

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. If that’s a shingle roof, replace it with something fire resistant or nonflammable.

Neighborhood issues: Fuels look dense and continuous. Fuel breaks, thinning of trees, and reduction of shrub continuity would help.

Slide
4



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.

Neighborhood issues: It looks like there are a lot of trees in the area... and many are deciduous. This

means home owners should plan to clean their roofs and rake their yards at least once a year.

Slide
5



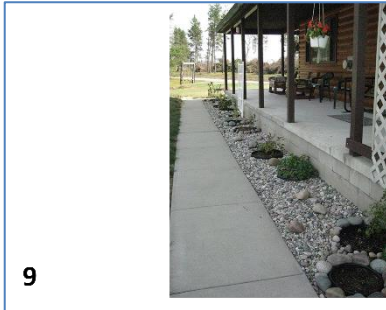
Good job! Trees in the area around the house have been thinned. The house looks free of clutter such as wood piles. The roof is clean and roofing material is fire resistant.

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.

Neighborhood issues: It looks like trees are quite dense and crowns are continuous outside the cleared, gravel-covered area; some further thinning would be good. Wherever it occurs, slash **MUST** be removed!

Slide
6

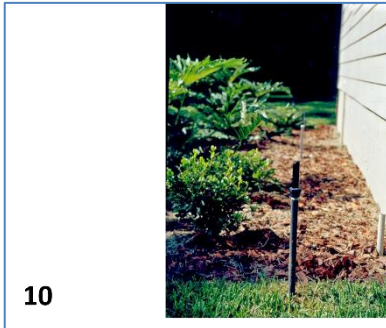


Good job! Clever the way rocks have been used to landscape around the foundation. It looks like there's green lawn on the other side of the sidewalk. It looks like trees in the background are spaced far apart.

Needs work: Can't think of anything other than maintenance.

Neighborhood issues: Looks pretty good. You can even see good road access. Hope that is consistent throughout the neighborhood.

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? Replace them with something nonflammable, like rocks or gravel. Keep the landscaping shrubs watered and moist.

Neighborhood issues: Hard to tell from this photo.

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 other than maintenance.

Neighborhood issues: As the dead needles fall off the scorched trees and shrubs near the house, they should be removed; if they cover the rock landscaping, they transform it into a fuel bed!

Slide
9



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.

Neighborhood issues: Looks pretty good – including the side gravel road. Just hope no one lives on the steep hillside above the home. If a fire starts uphill, burning materials can roll down to the foundation of this house unless it has a barrier or fire-resistant landscaping.