



S-190 Unit 1: Basic Concepts of Wildland Fire

Summary:

The ability to apply knowledge of fuels, terrain, weather, and fire behavior begins with the language and terminology used in wildland fire.

Incident Position Description (IPD) Alignment:

This unit aligns with the following FFT2 IPD specific duties
(<https://www.nwcg.gov/positions/fft2/position-ipd>):

- Apply the knowledge of fuels, terrain, weather, and fire behavior to decisions and actions.

Objectives:

Students will be able to:

- Describe basic terminology used in wildland fire.
- Describe the elements of the fire triangle.
- Describe the methods of heat transfer.

Unit at a Glance:

Topic	Method	Duration
Unit Introduction	Presentation	5 Minutes
Basic Fire Terminology	Group Activity	30 Minutes
The Fire Triangle	Presentation	15 Minutes
Methods of Heat Transfer	Presentation	10 Minutes
Total Unit Duration		60 Minutes

Materials:

- *Incident Response Pocket Guide (IRPG)*, PMS 461, <https://www.nwcg.gov/publications/461>.
- *NWCG Glossary of Wildland Fire*, PMS 205, <https://www.nwcg.gov/glossary/a-z>.
- Notebooks for participants.
- Ability to display images and video on large screen.
- White board or easel access for group breakout.

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Slide 1



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Slide 2

Objectives

Students will be able to:

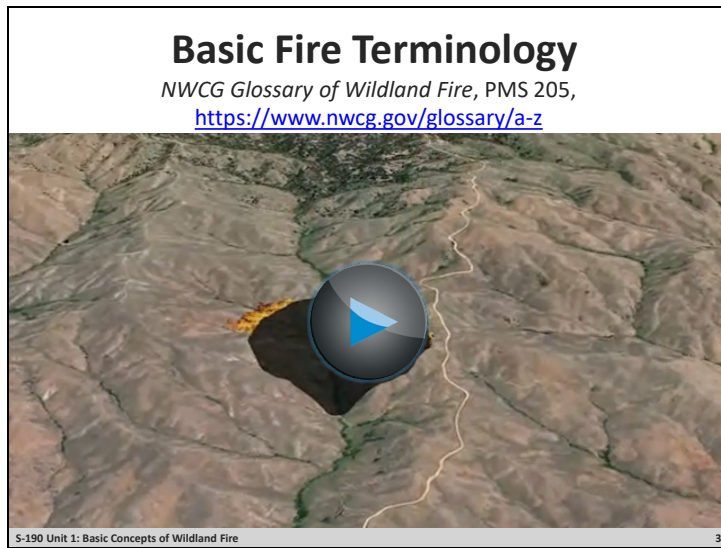
- **Describe basic terminology used in wildland fire.**
- **Describe the elements of the fire triangle.**
- **Describe the methods of heat transfer.**

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☐ Review unit objectives.

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Pre-Video Discussion

- In this scenario, firefighters have arrived on scene of a new fire. They are gathering and communicating their situational awareness of the current fire behavior.
- This scenario is representative of a ground resource communicating with an air resource who is able to provide a bird's eye view of the situation.

Video Exercise

- ☐ Instruct participants to watch the video.
- ☐ Each individual should write down as many basic fire terms as possible.
- ☐ **Play Video**

Title Basic Fire Terminology

Summary A simulated aerial flight of a fire and communication between ground and air resources.

Time (02:20)

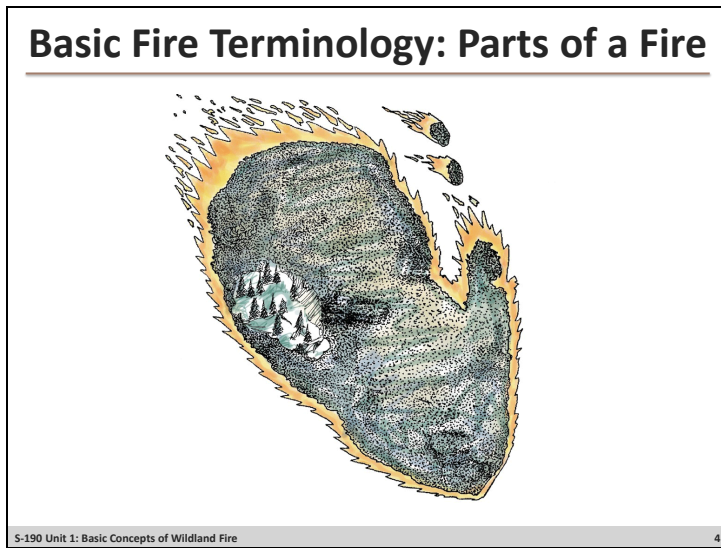
Audio

Post-Video Discussion

This unit will discuss many of these terms in more detail.

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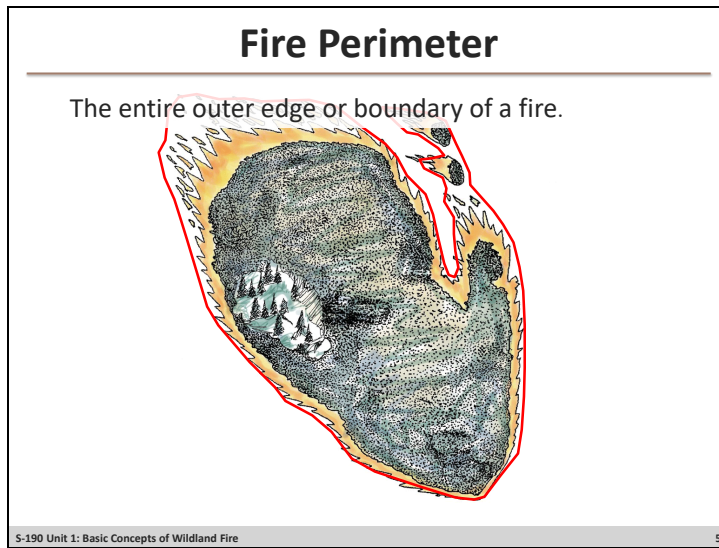


Exercise

- ☐ Advise participants that the next few slides will introduce common terms that describe parts of a fire.
- ☐ Divide participants into groups.
- ☐ Task each group with replicating the slide image on a whiteboard or flip chart. A simple outline shape, like that of a mitten glove, is all this is required.
- ☐ Ensure that each group has designated the spot fires and island represented in the slide image before continuing.
- ☐ Task each group with listing each term and definition at its associated location on their whiteboard or flip chart image.

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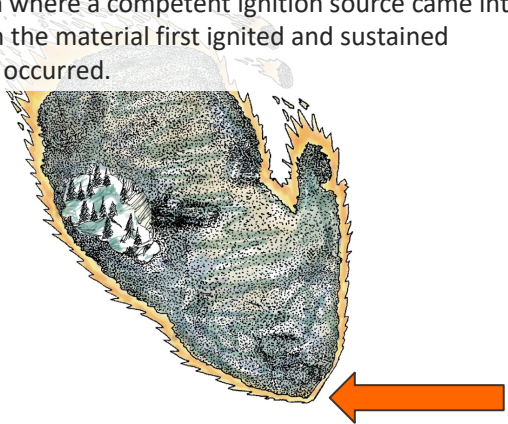
- ❑ Reference Average Perimeter in Chains in the *Incident Response Pocket Guide (IRPG)*, PMS 461, <https://www.nwcg.gov/publications/461>.

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Point of Origin

The location where a competent ignition source came into contact with the material first ignited and sustained combustion occurred.



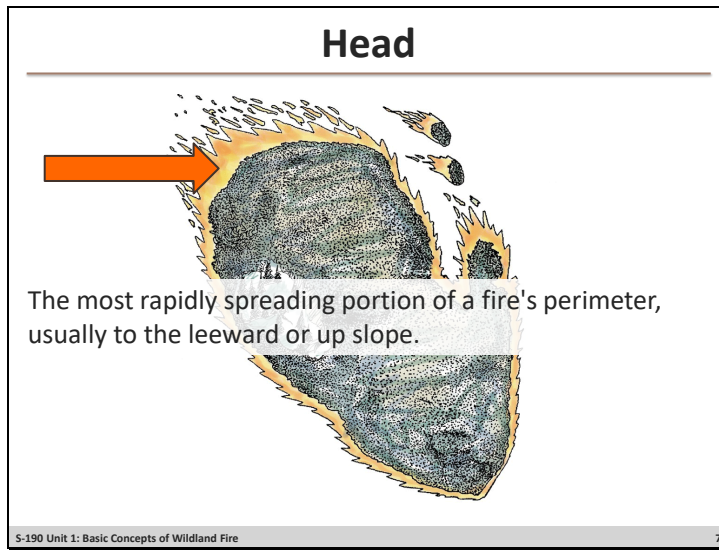
The diagram shows a wildland fire spreading from a point of origin, indicated by a large orange arrow pointing to the base of the fire. The fire is depicted as a dark, irregular shape with a jagged, yellow-orange border representing the fire front. Inside the fire, there are green and brown patches representing vegetation. A small, white, conical object, possibly a fire hydrant or a small structure, is shown within the fire area. The background is a light gray, suggesting a landscape.

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- ☐ Reference Fire Origin Protection Checklist in the *Incident Response Pocket Guide (IRPG)*, PMS 461, <https://www.nwcg.gov/publications/461>.

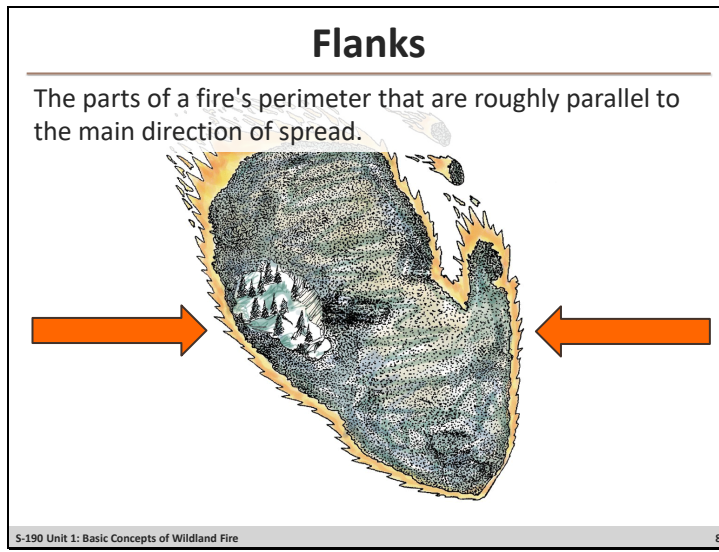
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Slide 8

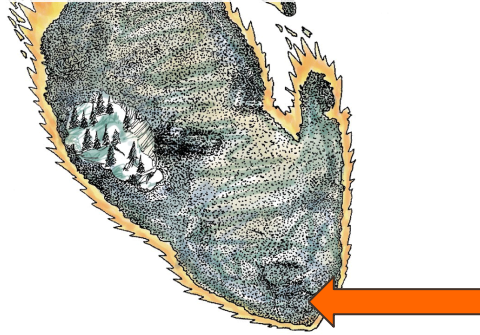


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Rear or Heel

That portion of a fire edge opposite the head. Slowest spreading portion of a fire edge.

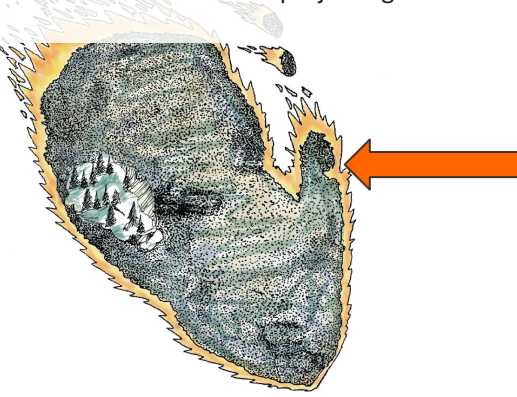


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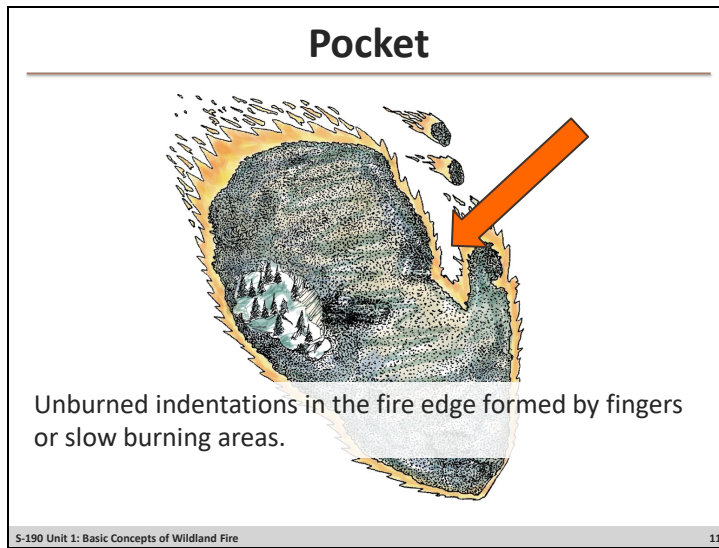
Finger

The long narrow extensions of a fire projecting from the main body.



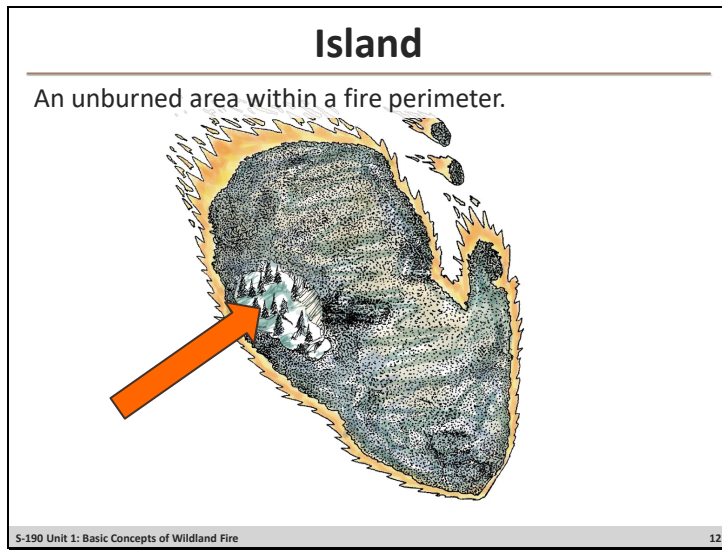
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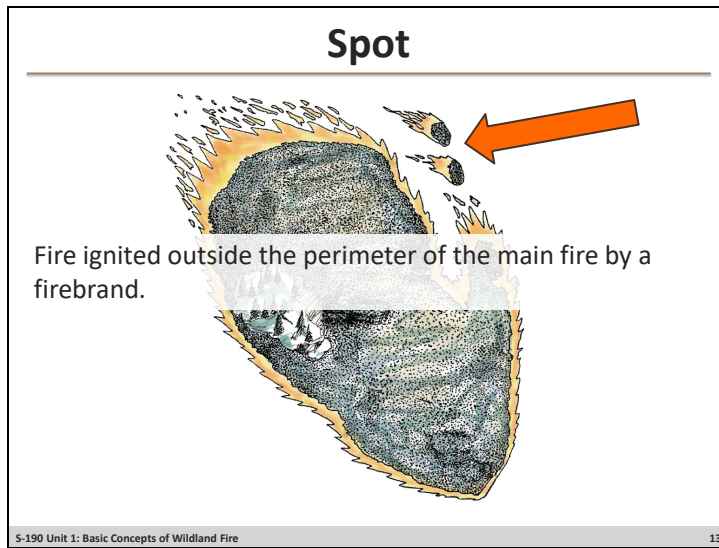
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Slide 13



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Slide 14

Basic Fire Terminology: Suppression

- Anchor point
- Control line
- Fireline
- Mopup
- Contained
- Controlled
- Chain



NWCG Glossary of Wildland Fire, PMS 205,
<https://www.nwcg.gov/glossary/a-z>

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- ☐ Instruct participants to write down the term and definition as you provide it to them.
- ☐ Validate term and definition by providing a simple description of where or how the term applies to the fire image on the slide.

Anchor Point

An advantageous location, usually a barrier to fire spread, from which to start constructing a fireline. The anchor point is used to minimize the chance of being flanked by the fire while the line is being constructed.

Control line

An inclusive term for all constructed or natural barriers and treated fire edges used to contain a fire.

Fireline

The part of a containment or control line that is scraped or dug to mineral soil.

Mopup

Extinguishing or removing burning material near control lines, felling snags, and trenching logs to prevent rolling after an area has burned, to make a fire safe, or to reduce residual smoke.

Contained

The status of a wildfire suppression action signifying that a control line has been completed around the fire, and any associated spot fires, which can reasonably be expected to stop the fire's spread.

Controlled

The completion of control line around a fire, any spot fires, and any interior islands to be saved. Burn out any unburned area adjacent to the fire side of the control lines. Cool down all hotspots that are immediate threats to the control line, until the lines can reasonably be expected to hold under the foreseeable conditions.

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Chain

Unit of measure in land survey, equal to 66 feet (20 M) (80 chains equal 1 mile). Commonly used to report fire perimeters and other fireline distances. Popular in fire management because of its convenience in calculating acreage (example: 10 square chains equal one acre).

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Basic Fire Terminology: Behavior



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Exercise

- ☐ Advise participants that slides 16-25 are common terms associated with fire behavior.
Participants can remain in same group breakouts from parts of a fire exercise.
- ☐ Inform participants that in addition to being able to describe the various parts of a fire, it's also important to be able to describe the character of the fire behavior.
- ☐ Task each group with listing the term from the slide on a white board or flip chart.
- ☐ Provide participants with the definition provided in the unit guide.
- ☐ Reference Fire Behavior Hauling Chart in the *Incident Response Pocket Guide (IRPG)*, PMS 461, <https://www.nwcg.gov/publications/461>.

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Smoldering

Fire burning without presence of flame or direct flame and barely spreading.



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Creeping

Fire burning with a low flame and slowly spreading.



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Running

Behavior of a fire spreading rapidly with a well-defined head.



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Spotting

Behavior of a fire producing sparks or embers that are carried by the wind and which start new fires beyond the zone of direct ignition by the main fire.



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Torching

The burning of the foliage of a single tree or a small group of trees, from the bottom up.



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Flare-Up

Any sudden acceleration in the rate of spread or intensification of the fire. A flare-up is of relatively short duration and does not change existing control plans.



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Fire Whirl

Spinning vortex column of ascending hot air and gases rising from a fire and carrying aloft smoke, debris, and flame.



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Backing

That portion of the fire with slower rates of fire spread and lower intensity, normally moving into the wind and/or down slope.



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Flaming Front

That zone of a moving fire where the combustion is primarily flaming.



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Crowning

A fire that advances from top to top of trees or shrubs more or less independent of a surface fire.



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☐ Play Video

Title Crown Fire

Summary A wildfire crowning.

Time (00:12)

No Audio

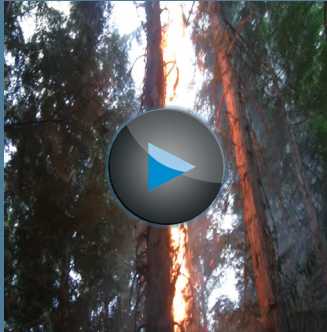
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Slide 26

Knowledge Check

Basic Terminology Used in Wildland Fire

Identify this fire behavior.



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Question: Identify this fire behavior.

Answer: Torching

☐ Play Video

Title Torching Tree

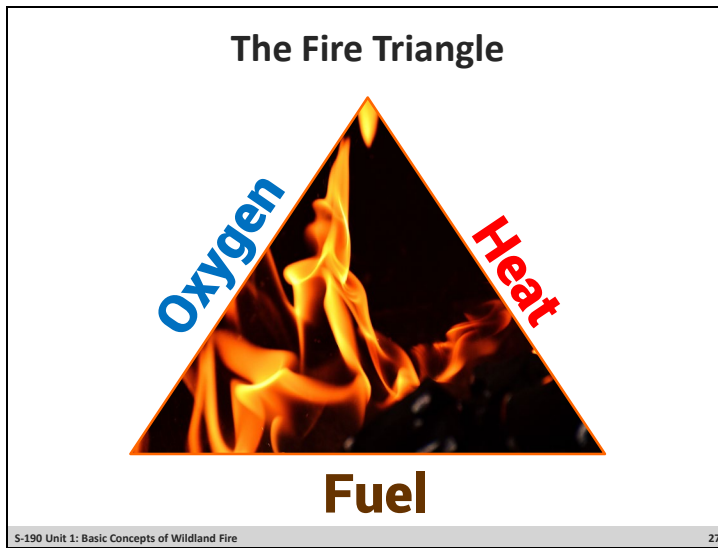
Summary A pine tree torching.

Time (00:18)

No Audio

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- ☐ Three elements comprise the fire triangle: oxygen, heat, and fuel.
- ☐ These three elements must be present and combined before combustion can occur and continue.

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Oxygen

- The air we breathe contains 21%.
- Approximately 16% is required for combustion.

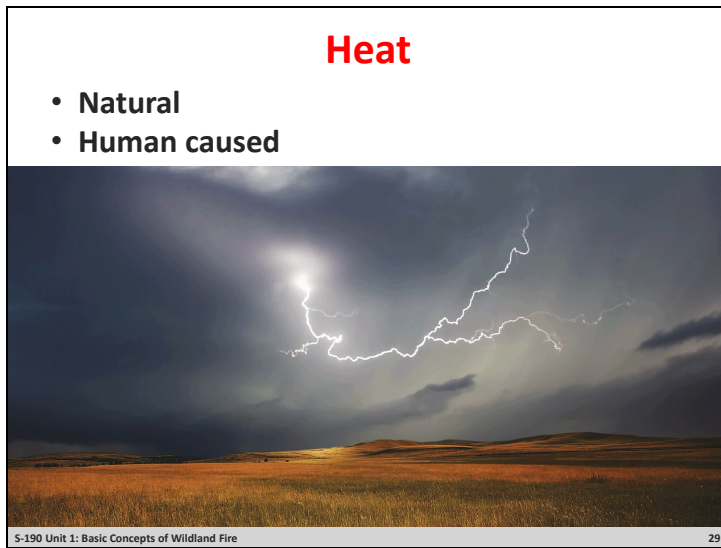


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- ☐ The most abundant chemical element on earth is oxygen.
- ☐ Oxygen supports the chemical processes that occur during a wildfire.
- ☐ When fuel burns, it reacts with oxygen from the surrounding air, releasing heat, and generating combustion products such as gases, smoke, and embers. This process is known as oxidation.

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- A heat source is responsible for initial ignition of a wildfire and is also needed to maintain the fire and enable it to spread.
- Lightning is the most common natural source of heat.
- Humans can cause heat leading to wildland fires.

Question: Where does human-caused heat come from?

Answers: Abandoned campfires, arson, matches, dragging chains, burning trash, etc.

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Fuel

- Grass
- Shrub
- Timber
- Slash
- Artificial materials

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- Fuel is the material that is burning.
- Fuel can be any kind of combustible material, especially petroleum-based products, and wildland fuels.


Note to Instructor

The fuel types listed on this slide will be discussed in detail in Unit 2.

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Slide 31

Breaking the Fire Triangle:
Removal of one or more elements of the triangle



Heat **Oxygen** **Fuel**

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Question: How might you break the fire triangle from the fuel element?

Answer: Removal of fuel by clearing space.

Question: How might you break the fire triangle from the oxygen element?

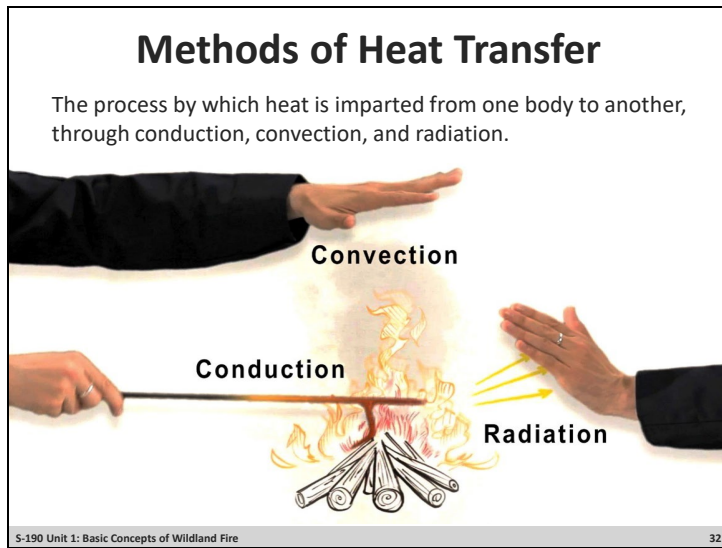
Answer: Removal of oxygen by restricting the oxygen supply.

Question: How might you break the fire triangle from the heat element?

Answer: Removal of heat by applying water, dirt, or other methods.

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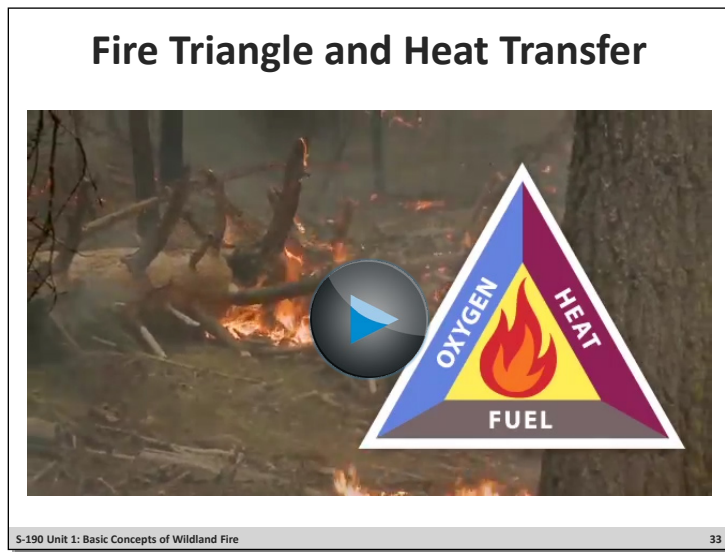


Note to Instructor

The methods of heat transfer will be discussed in detail on slides 34-36.

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Slide 33



Video Introduction

The video combines the elements of the fire triangle with the concepts of heat transfer.

☐ Play Video

Title Fire Triangle and Heat Transfer

Summary An introduction to combustion and heat transfer through conduction, convection, and radiation.

Time (07:05)

Audio

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Slide 34

Conduction

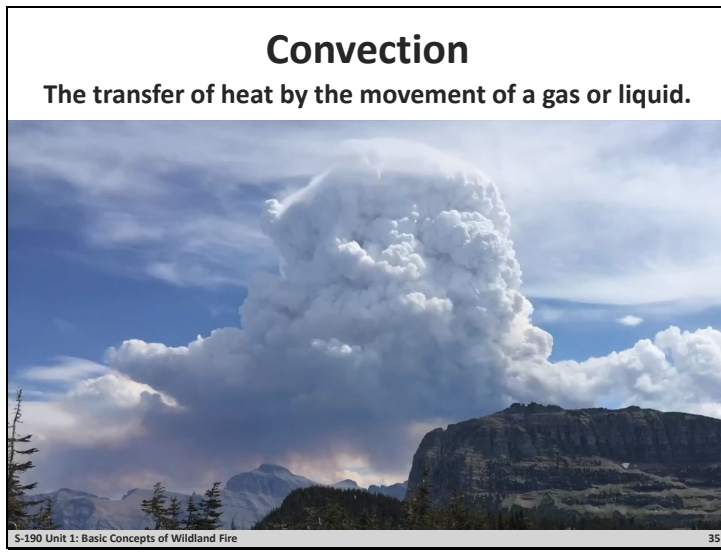
The transfer of heat through direct contact.



- Think of conduction as a spoon in a hot drink. Heat is conducted from one fuel particle to another in the same way, through direct contact.
- Since wood is a poor conductor (meaning heat will not travel through it easily), this process is less of a factor to fire behavior.

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- Convection occurs when lighter warm air moves upward.
- Think of convection as a smoke column above the fire. The hot gases and embers which compose the smoke column move and can dry and ignite other fuels.

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Radiation

Transfer of heat in a straight line through a gas or vacuum other than by heating of the intervening space.



- Radiant heat warms you as you stand close to a campfire or stand in the sunlight.
- Radiant heat can dry surrounding fuels and sometimes ignite them.


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Slide 37

Knowledge Check

Basic Terminology Used in Wildland Fire

Describe what the term **Anchor Point** means.



The diagram shows a fire front spreading across a landscape. A large, dark, irregular shape represents the fire. A jagged line of fire is at the top, with flames and smoke rising. A large orange arrow points to a specific location on the fire front, which is the anchor point. The landscape is depicted with green and brown patches, and a small cluster of trees is visible on the left side of the fire front.

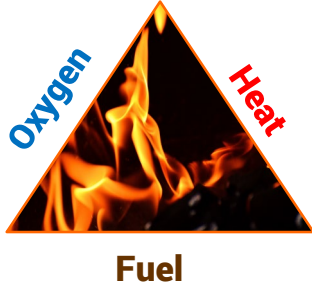
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Question: Describe what the term **Anchor Point** means.

Answer: An advantageous location, usually a barrier to fire spread, from which to start constructing a fireline.

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Knowledge Check	
Elements of the Fire Triangle	
Describe the elements of the fire triangle.	 <p>The diagram illustrates the fire triangle, a concept in fire science. It features a triangle with a fire burning inside. The left side of the triangle is labeled 'Oxygen' in blue text. The right side is labeled 'Heat' in red text. The bottom side is labeled 'Fuel' in brown text.</p>

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Question: Identify the elements of the fire triangle.

Answer: Oxygen, Heat, Fuel

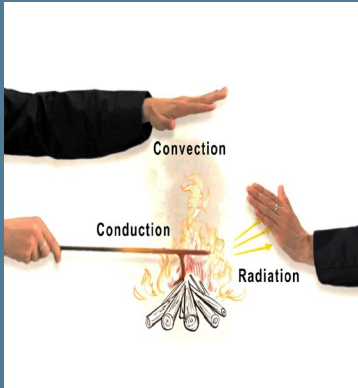
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Slide 39

Knowledge Check

Methods of Heat Transfer

Describe the methods of heat transfer.



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Question: Describe the methods of heat transfer.

Answer: Conduction is direct contact. Convection is the movement of air. Radiation is the transfer of heat.

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Objectives

Students will be able to:

- Describe basic terminology used in wildland fire.
- Describe the elements of the fire triangle.
- Describe the methods of heat transfer.

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☐ Review unit objectives.