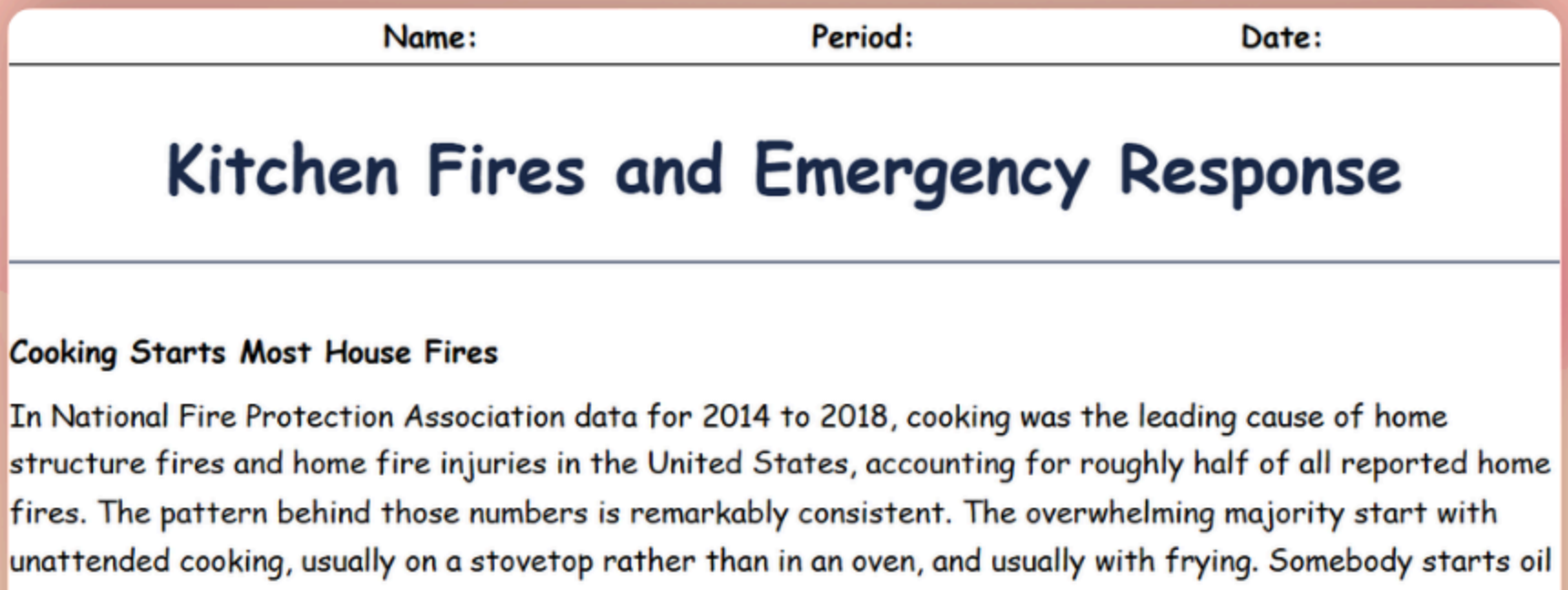
NO PREP

Kitchen Fires and Emergency Response

Includes: Student reading, case study, differentiated questions, teacher key



Name: Period: Date:

Kitchen Fires and Emergency Response

Cooking Starts Most House Fires

In National Fire Protection Association data for 2014 to 2018, cooking was the leading cause of home structure fires and home fire injuries in the United States, accounting for roughly half of all reported home fires. The pattern behind those numbers is remarkably consistent. The overwhelming majority start with unattended cooking, usually on a stovetop rather than in an oven, and usually with frying. Somebody starts oil

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The Fire Triangle and Classes of Fire

Every fire requires three things at once: fuel, oxygen, and heat. Remove any one and the fire goes out. That principle, called the fire triangle, is the logic behind every extinguishing method there is. Water works on ordinary fires by removing heat. A lid

on a pan works by removing oxygen, which is called smothering. Baking soda works chemically by releasing carbon dioxide that displaces oxygen. Fires are sorted into classes according to what is burning, and using the wrong class of extinguisher can make a fire dramatically worse. Class A covers ordinary combustibles like paper, cloth, wood, and most trash. Class B covers flammable liquids such as gasoline and solvents. Class C covers energized electrical equipment, where water would conduct current back to the person holding the hose. Class D covers combustible metals, which is a manufacturing concern rather than a kitchen one. Class K is the one that matters most in a kitchen, and it covers cooking oils, greases, and fats. Class K extinguishers use a wet chemical agent that reacts with hot oil to form a soapy foam layer, a process called saponification, which seals the surface and cools it. Commercial kitchens are required to have a Class K extinguisher near cooking equipment, and most also have an automatic hood suppression system above the fryers and range. Multipurpose ABC extinguishers, the red canisters found in most homes and classrooms, cover the three most common classes at once. They are the right tool for a trash can or an electrical fire, but they are not rated for a deep fryer, and their dry chemical can scatter burning oil if aimed directly into a pan.

Why Water Makes a Grease Fire Worse

The instinct to throw water on a fire is powerful and, for a grease fire, catastrophically wrong. Understanding the physics makes the rule stick better than memorizing it. Cooking oil in a burning pan is somewhere above 600 degrees F. Water boils at 212 degrees F. When water hits that oil it does not sit on top or mix in; it sinks, because water is denser than oil, and then it flashes to steam instantly. Liquid water expands roughly seventeen hundred times in volume when it becomes steam. That expansion happens underneath the burning oil and blows it out of the pan in every direction as a cloud of flaming droplets. Fire departments demonstrate this every year with a cup of water and a pot of burning oil, and the resulting fireball routinely reaches the ceiling. The correct response to a pan fire is to smother it. Turn off the heat if you can reach the knob safely. Slide a metal lid or a baking sheet over the pan from the side, keeping your hand and arm behind the lid rather than over the pan, and leave it in place until the pan is completely cool. Do not move the pan, because carrying a burning pan spreads fire along your path and puts it against your body. Baking soda works on a small flare-up. Flour does not; it is

combustible and will make things much worse. Fine flour dust suspended in air can actually explode, which is why grain elevators and commercial bakeries have dust control systems. A fire blanket is the other correct tool for a pan fire, and for a person whose clothing has caught fire, and every foods lab should have one mounted where students can reach it without crossing the room.

PASS, RACE, and Knowing When to Leave

If a fire is small, contained, and you have a clear exit behind you, an extinguisher may be appropriate. The technique is remembered as PASS. Pull the pin. Aim low at the base of the flames, not at the top, because the base is where the fuel is. Squeeze the handle. Sweep from side to side until the fire is out. Stand six to eight feet back, and never let the fire get between you and the door. A typical portable extinguisher discharges completely in about ten seconds, so there is no second attempt. The larger decision framework is RACE. Rescue anyone in immediate danger. Alarm, meaning pull the fire alarm and call 911. Confine the fire by closing doors as you leave, which slows it significantly. Extinguish only if it is safe, or Evacuate. The judgment call matters more than the technique. Fight a fire only if it is smaller than you are, if you have the right extinguisher, if the room is not filling with smoke, and if you have a clear escape route at your back. If any of those is missing, leave and close the door behind you. Property is insured. Two other emergencies belong in the same drill: a person whose clothing catches fire should stop, drop, and roll, and an oven fire should be handled by turning the oven off and leaving the door closed. Opening the oven door feeds the fire a rush of oxygen and can push flame out at face level, so the door stays shut until the fire is out and the oven is cool. A microwave fire follows the same rule: stop the unit, leave the door closed, and unplug it if the cord is safely reachable.

Preparation Beats Reaction

Every fire response above works better when the preparation happened months earlier, which is why fire safety is mostly a maintenance topic. Smoke alarms should be installed on every level of a home and tested monthly, with batteries replaced at least annually and the entire unit replaced every ten years. Keep the alarm slightly away from the kitchen itself so cooking steam does not cause nuisance alarms, because an alarm somebody disabled out of annoyance protects nobody. Fire extinguishers need an accessible mounted location near an exit, a pressure gauge

checked monthly, and an annual professional inspection. In a school lab, students should know the location of every extinguisher, the fire blanket, the alarm pull station, the shutoff for gas, and both exit routes before they ever turn on a burner. Housekeeping does quiet work too. Clean grease off the range, hood, and filters regularly, because accumulated grease is fuel that spreads a small fire into a structural one. Keep towels, paper, packaging, and pot holders away from burners, and never store anything on top of the stove. Roll up loose sleeves and tie back long hair. Finally, have a plan people have actually said out loud: where the class meets outside, who calls 911, and who accounts for everyone. A plan that exists only in a binder is not a plan. The reason schools run fire drills rather than simply posting evacuation maps is that under real stress people do what they have practiced, and a route you have walked once is worth more than a diagram you have read ten times.

Key Information: Kitchen Fire Safety

Detail	Information
Leading Cause	Cooking caused about half of reported home structure fires in 2014-2018 NFPA data
Most Common Factor	Unattended cooking, usually frying on a stovetop
Fire Triangle	Fuel, oxygen, and heat; remove one and the fire stops
Class K	The extinguisher class for cooking oils, greases, and fats
Water on Grease	Water sinks, flashes to steam, and sprays burning oil
Correct Response	Turn off heat and smother with a metal lid or baking sheet
PASS	Pull, Aim at the base, Squeeze, Sweep side to side
RACE	Rescue, Alarm, Confine, then Extinguish or Evacuate

Case Study: Thanksgiving and the Pan on the Back Burner

Tyler was seventeen and in charge of frying the onions for the stuffing while his family handled the rest of Thanksgiving dinner. He set a pan of oil over medium-high heat and walked to the living room to answer a question about the game. Ninety seconds later his cousin yelled from the kitchen. The oil had ignited and flames were curling above the pan toward the hood. Tyler's first instinct was the sink; he was two steps toward it with a cup when his grandmother stepped in front of him, shut off the burner, and slid a sheet pan across the top of the skillet from the side. The flames died in about four seconds. She left the sheet pan in place for twenty minutes and would not let anyone lift it to check. "Water would have put that on the ceiling," she told him later, while the pan cooled. "And on you. That oil was somewhere past six hundred degrees." Tyler had cooked with her since he was nine and had never once seen her walk away from a hot pan.

1. Explain in physical terms what the reading says would have happened if Tyler had reached the sink with that cup of water.

2. Tyler's grandmother slid the pan across from the side rather than lowering it from above. Using the fire triangle, explain both that choice and why she left it in place.

Multiple Choice

1. Which class of fire extinguisher is rated for cooking oils and greases?

    a) Class A

    b) Class B

    c) Class K

    d) Class C

2. Why does water make a grease fire dramatically worse?

    a) It sinks and flashes to steam, spraying burning oil

    b) It reacts chemically with oil to create more fuel

    c) It cools the pan too quickly and cracks the metal

    d) It conducts electricity from the burner to the cook

3. In the PASS technique, where should the extinguisher be aimed?

    a) At the wall behind the fire

    b) At the ceiling above the fire

    c) At the base of the flames

    d) At the top of the visible flames

Matching

Write the letter of the correct definition on the line next to each term.

Term	Definition
1. ___ fire triangle	A) Putting out a fire by cutting off its supply of oxygen
2. ___ saponification	B) The decision framework for responding to a fire emergency
3. ___ smothering	C) The reaction that turns hot oil into a sealing soapy foam layer
4. ___ PASS	D) The three elements a fire needs: fuel, oxygen, and heat
5. ___ RACE	E) The four-step method for operating a portable fire extinguisher

Fill-in-the-Blank

1. Cover a pan fire with a metal _____ and turn off the heat.

2. The fire triangle is fuel, heat, and _____.

3. A person whose clothes catch fire should stop, drop, and _____.

Short Answer

Answer each question in 2-4 complete sentences.

1. Explain why the reading says staying in the room is the most effective fire prevention measure.

_____

_____

_____

2. Describe the four conditions the reading says must all be true before fighting a fire yourself.

3. Why is carrying a burning pan to the sink dangerous even if you never add water?