

FIRE SAFETY (LEVEL 3)

Description	Learners explore the concept of combustion and create a fire safety handbook for their school and its students, including evacuation plans and a fire extinguisher.
Leading question	What should we do if there is a fire at home or at school?
Subjects covered	Science, Math, English, Art and Design
Total time required	40-60 min a day for 5 days
Resources required	Paper, Pencil, Piece of coal, piece of wood, paper, stone, straw/hay, match stick, iron nail, synthetic fabric, tongs, candles, transparent plastic packet, water, dry coconut husk/ crushed dry leaves and twigs, empty plastic water bottle/old vessel washing soap bottle, string, vinegar, tissue paper, baking soda, water, a source of fire (lighter/matchbox etc.)
Learning outcomes:	By the end of this project, learners will be able to: Knowledge-Based Outcomes: 1. Differentiate between combustible and non-combustible substances and explain the essential conditions of combustion. 2. Performs various tests, and experiments related to combustion and flame (zone of flame). 3. Explain the methods of controlling fire. 21st Century Skill Outcomes: 1. Collaborate effectively through seeking feedback on their work toward developing the safety guide. 2. Think critically while generating ideas to put out fires and create an efficient evacuation plan. 3. Communicate effectively during the presentation of the fire safety procedure and provision of feedback to the audience.
Previous Learning	Oxidation
Supervision required	High

Day 1 -

Today, you will understand the process of combustion, identify combustible and non-combustible substances, and start creating your fire safety guides.

Time	Activity and Description
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5 minutes	Introduction: - What do you use to cook food at home? (<i>LPG stove/burning coal</i>) - What happens when you light a match? (<i>The top part catches fire and then the stick burns</i>) - How do you light firecrackers? (<i>Use a match stick/candle/lit sparkler</i>) - Could you see what is common in all these activities? Fire! - While fire is very useful, it can also be dangerous! - In this project, we are going to explore how fire works and what happens if we cannot control it. - We will then use this knowledge to create a fire safety plan for our class and school. This will include things like: 1. An evacuation plan and a fire drill (<i>practising the evacuation plan</i>) 2. A safety handbook for our juniors on how to deal with fire 3. A fire safety kit for our classrooms with a fire extinguisher and fire safety blanket
10 minutes	Reading Comprehension: The Discovery of Fire Note: <i>If you cannot provide copies to learners or display the story on a screen for them to read, you can read it out loud to them and have them make notes of their answers.</i> Our ancestors learnt how to light and use fire about 500,000 to 1 million years ago. The oldest evidence of humans using fire was recently found in South Africa.  It is believed that at first, they used fire from accidental forest fires or volcanoes and kept them burning. Soon they learned how to start a fire by rubbing two stones or dry sticks together to create a spark! The discovery of fire paved the way for civilisation. They used fire to cook food and scare away animals. They could also settle in colder areas as fire kept them warm. They even built stronger tools using fire. - Based on what you read think and answer the following: 1. How did our early ancestors start their own fire? 2. Did our ancestors use fire for the same things as we do today? How has our use of fire changed? - Let us discuss your answers to the second question. (<i>Our ancestors used fire to cook, to scare away animals, for light and warmth, and to make tools. Today we use it for things like cooking, making metallic objects like vessels, poles, vehicles etc., for warmth, and producing electricity.</i>)

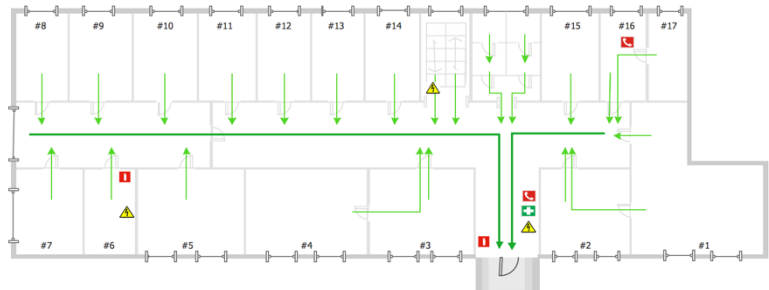
	Note: Learners can try lighting a fire using sticks under strict supervision. Reference - https://www.youtube.com/watch?v=l8C8qPoMZdo&ab_channel=TKOR																				
15 minutes	Combustion and Combustible Substances: - Now, let us understand a little more about fire and the process of burning. Note: Light a match in front of the learners and ask the listed questions. - What do you observe? (<i>The match catches fire and burns with a yellow/orange flame</i>) - What effects does the fire produce? (<i>Heat and light</i>) - This process by which a substance reacts with air to burn and produce heat is called combustion. - A substance that burns is known as a combustible substance or a fuel. - Now, let us think – are all substances combustible? - We will experiment to find out. Note: Ask learners to draw the following table in their notebooks, fill out the hypothesis, and keep filling the other sections out as they observe the experiment.																				
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	Tip: Help students write their observations and inferences in the table template.											
10 minutes	Starting their fire safety handbook: - Now, based on our observations, can you look around and think, if a fire were to break out: Which things here are combustible and would therefore be unsafe to be near or carry? Would it be safe to remain in this classroom? - What would happen if we remained in the classroom when a fire breaks out? <i>(Combustible materials in class could include books, paper, wooden pencils, furniture, clothing, bags, etc. In case of a fire, we must immediately evacuate the building, not just because things around us are combustible and can burn us but also because fire leads to smoke and inhaling smoke can cause serious illnesses and even death.)</i> - Therefore, having an emergency evacuation procedure is very important. We must also practice this by having a fire drill in which we practice how to safely exit the building in case of a fire. - In your groups discuss the best routes we could take to exit the building. - In the next class, we will create a map of exits and choose our evacuation routes. Note: <i>If there are multiple floors in the school, you can assign different floors to each group and ask them to create the evacuation plan for that floor.</i>											
At-home activities	After/before school or in the recess, take a few minutes to explore the floor plan and exits in the school. Draw a rough map if needed.											

Day 2

Today, you will create maps of your school/ apartment building/ house to show exits and evacuation routes in case of a fire, and also develop an evacuation procedure.

Time	Activity and Description
5 minutes	Recap: Let us recap which materials are combustible and which aren't. Show a thumbs up if the material is combustible and a thumbs down if it is not! 1. Nylon cloth or rope/synthetic fabric 2. Stone bench 3. Notebook 4. Wooden chair 5. Steel bottle

	6. Pencil 7. Spoon In the previous class, we began thinking about our evacuation plan, today, we will draw a map marking the closest exits to use in case of a fire.
10 minutes	Evacuation Routes and Map: - Now, draw a map of your school/ apartment building/ house (<i>allow learners to choose one</i>). - Mark some important locations that will help readers interpret the map. - Mark all the exits that can be used to reach a safe/ open area close to the building. - Then based on the location of your classroom/ apartment/ room, chart the best route to exit the building. - Once you are done, share your map and explain why you chose that particular route. Fire exit plan 
10 minutes	Presenting and Revisiting their Maps: Note: <i>In case only one learner is participating in the project, provide them with feedback and ask them questions based on the description below.</i> Present your maps to your friend and ask them for their feedback. They can also ask questions if they like. Ask them to think about the following: - Is this route the most suitable? Is it the shortest and fastest way to leave the building? - Would anyone face any challenges while using this route? <i>After learners present their maps:</i> - Based on any feedback received, look at your maps again and see if you want to make any changes to them.

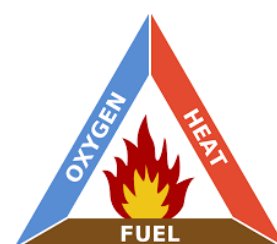
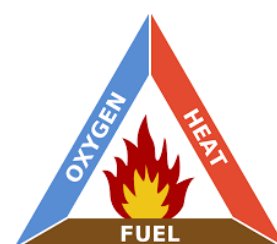
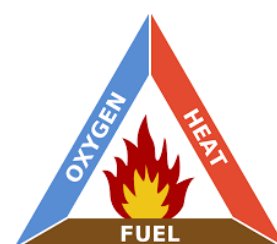
5 minutes	- Now that we know our routes, would it be ok if everyone simply rushed out and ran to the exits? - One way to remember how to react in case of a fire is to CARE: C – close the door after exiting the location (<i>to stop the fire from spreading</i>) A – alert others R – report the fire to authorities E – evacuate the building - Create a plan on how we all should get up and get out of class in an orderly manner. - Clearly write down step-by-step instructions. You can even add drawings to make the steps easier to understand.
10 minutes	Practising the Evacuation Procedure: Let us now practice how we would get up and exit the building in case of a fire.
At-home activities	1. Write the final steps of the evacuation plan to add to the fire safety handbook. 2. Make a similar map of your house/ another building marking all the doors and windows that could be used as an exit in case of a fire.

Day 3 –

Today, you will explore the factors needed for combustion and how fires can be controlled and extinguished.

Time	Activity and Description				
20 minutes	Combustion Needs Heat: - In the previous classes, we learnt what combustion means and came up with steps on what needs to be done when a fire breaks out in a classroom. - Today, we will understand what factors are necessary for combustion and therefore, how we can actually control or extinguish fires. Note: - <i>Ask learners to copy the table shown below and fill in their hypothesis. They can fill the rest of the portions as the experiment progresses.</i> - <i>Please conduct this experiment as a demonstration for safety reasons.</i> <table border="1"> <tr> <td>Hypothesis:</td><td>Combustion needs heat to start and continue.</td></tr> <tr> <td>Materials Needed:</td><td>Transparent plastic packet, water, dry coconut husk/ crushed dry leaves and twigs, sunny open area</td></tr> </table>	Hypothesis:	Combustion needs heat to start and continue.	Materials Needed:	Transparent plastic packet, water, dry coconut husk/ crushed dry leaves and twigs, sunny open area
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	Method:	1. Perform the entire experiment under strict supervision. 2. Leave the coconut husk in the open sunlight for 2 minutes. 3. Then fill the plastic packet with water and tie it tightly to create a bulge. This is our water lens; it acts like a magnifying glass. 4. Use the packet of water to focus the sunlight onto the coconut husk for a few minutes. 5. After the husk catches fire, come up with your own way to put out the fire. Reference: See Appendix 1: https://www.instagram.com/reel/CtSYsYrrLn8/?igshid=MzRIODBiNWFIZA==
	Observations:	Sample observations include: 1. When left in open sunlight the husk does not burn. 2. When the light was focused on the husk, it started burning and smoke could be seen. 3. When water is poured over the twigs, the fire is put out.
	Inferences:	Sample inferences include: 1. The husk needed to receive a certain amount of heat to catch fire. Without enough heat, it does not catch fire. 2. Water puts out fire because it lowers the temperature.
	- Now let us reflect and share. - Why didn't the husk catch fire in the sun without our water lens? (For combustion to occur, the fuel or substance must reach its ignition temperature – this is the temperature at which it catches fire. The water lens, focused more heat on the twigs causing the temperature to rise and therefore, made them reach their ignition temperature and combust.) - What different ways did we use to put out the fire? Why did they work or not work? (For example, the temperature of the husk immediately fell when water was poured over it. This cut off the heat and therefore, the process of combustion stopped.) - Therefore, it is clear that heat is needed for combustion and if heat is removed, combustion will stop. - A combustible substance will not catch fire until it reaches its ignition temperature.	
10 minutes	Combustion Needs Oxygen: Note: - Just as done for the previous experiment, ask learners to copy the table shown below and fill in their hypothesis. They can fill the rest of the portions as the experiment progresses. - Please conduct this experiment as a demonstration for safety reasons.	

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10 minutes	<table><tr><td>Controlling Fire: - So now, based on these experiments, can you name 2 factors needed for combustion? (<i>Oxygen and heat to reach ignition temperature</i>) - There is also a third factor that is needed, can you guess what it is? - Fuel! Combustion needs something that can burn easily! In each case we had something act as fuel – twigs or a candle. - Combustion cannot take place if even one of these 3 factors is not present. - Therefore, can you imagine what you would need to do to put out a fire? (<i>Remove any one of the three factors</i>) - Can you list some ways in which people usually put out a fire or a flame? - <i>Pouring water</i> - <i>Pouring sand on it</i> - <i>Using a fire extinguisher</i> - <i>Wrapping a blanket around</i> - <i>Blowing on a candle</i> - Which factor or factors of combustion do each of these steps remove? - <i>Pouring water – reduces heat and cuts the oxygen supply</i> - <i>Pouring sand on it – cuts the oxygen supply</i> - <i>Using a fire extinguisher – reduces heat and cuts the oxygen supply</i> - <i>Wrapping a blanket around – cuts the oxygen supply</i> - <i>Blowing on a candle – sudden rush of air cools it down</i> </td><td></td></tr></table>	Controlling Fire: - So now, based on these experiments, can you name 2 factors needed for combustion? (<i>Oxygen and heat to reach ignition temperature</i>) - There is also a third factor that is needed, can you guess what it is? - Fuel! Combustion needs something that can burn easily! In each case we had something act as fuel – twigs or a candle. - Combustion cannot take place if even one of these 3 factors is not present. - Therefore, can you imagine what you would need to do to put out a fire? (<i>Remove any one of the three factors</i>) - Can you list some ways in which people usually put out a fire or a flame? - <i>Pouring water</i> - <i>Pouring sand on it</i> - <i>Using a fire extinguisher</i> - <i>Wrapping a blanket around</i> - <i>Blowing on a candle</i> - Which factor or factors of combustion do each of these steps remove? - <i>Pouring water – reduces heat and cuts the oxygen supply</i> - <i>Pouring sand on it – cuts the oxygen supply</i> - <i>Using a fire extinguisher – reduces heat and cuts the oxygen supply</i> - <i>Wrapping a blanket around – cuts the oxygen supply</i> - <i>Blowing on a candle – sudden rush of air cools it down</i>									
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	- Did you notice that in no situation can we actually remove the fuel as it is the thing that is burning. Therefore, we must find a way to reduce the heat or oxygen. - In the next class, we will make our own fire extinguishers using the principles we learned today!
At-home activities	1. Speak to your parents and elders to get their answers to the following questions and make a note of their responses: a. What can we do to prevent fires at home or in school? b. Who should we call If there is an emergency? c. What should I do If my clothes catch fire? d. What should I do if there is a fire in my home or school? e. What should I NOT do if there is a fire in my home/school? 2. Carry the following items to make a fire extinguisher: an empty plastic water bottle/old vessel washing soap bottle, string, vinegar, tissue paper, and baking soda.

Day 4 –

Today, you will create your own fire extinguishers and complete your fire safety handbooks.

Time	Activity and Description
15 minutes	Making Your Own Fire Extinguisher: - State the 3 factors that are needed for combustion. (<i>Heat, oxygen, fuel</i>) - Therefore, how can we control fires? (<i>By removing any one of these factors, usually heat or oxygen</i>) - Now, we will make our own fire extinguishers that will help us extinguish fires! We can then place one fire extinguisher in every class and demonstrate how students can use them. Reference: See Appendix 2 https://www.youtube.com/watch?v=hJFyl2iGWxs&t=51s&ab_channel=ChampakWorld Materials needed: empty plastic water bottle/old vessel washing soap bottle, string, vinegar, tissue paper, baking soda, water  

	Method: 1. Fill the $\frac{1}{4}^{\text{th}}$ of the bottle with water. 2. Pour the same amount of vinegar into the bottle. 3. Place the vinegar and the bottle aside and make sure there is no vinegar on your hands. 4. Take about 1 tablespoon of baking soda and pour it into the piece of tissue paper. 5. Wrap the tissue and tie it up with the string so that the baking soda is secure and does not spill out. Make sure there is a long portion of the string still left hanging. 6. Now insert and dangle the tissue inside the bottle such that it does not touch the water and vinegar at all. 7. Leave the length of the string hanging outside the bottle and screw the bottle cap on. 8. The fire extinguisher is ready. Testing the extinguisher (<i>only a teacher/adult should do this</i>): - Light a small piece of newspaper on fire in a steel glass. - Shake the extinguisher, open the bottle and pour it over the fire. - The fire should go out. Reflection: - What do you think happened here? (<i>have learners record their responses in their notebook</i>) After taking some responses: - To use this extinguisher, all we have to do is shake the bottle. - When the vinegar and water mix with the baking soda, the reaction produces Carbon Dioxide. - When we open the bottle and pour it over the fire 3 things happen: 1. The carbon dioxide cuts the oxygen supply 2. The water brings the temperature down 3. The fire goes out - And thus, the fire gets extinguished.
5 minutes	Instructions on Using the Fire Extinguisher: - Now let us ensure that everyone knows how to use these extinguishers. - Write the steps to use the fire extinguisher on a separate page of the handbook. - Make sure the instructions are clear and you can use sequencing words such as first, next, then etc. - You can even draw a picture labelling the different parts of the model.



20 minutes	Completion of the Handbook: - Choose the 3-4 best tips for each question and add them in the different sections of your fire safety handbook: a. To prevent a fire, I should... b. If there is an emergency, I should call... c. If my clothes catch fire, I should... d. If there is a fire in my home/school I should... e. If there is a fire, I should not.., - Include drawings/images so that it is easy for anyone to understand. - Once done, check that your handbook has all of the following: a. Map of the building with exits b. Steps for evacuation plan c. Instructions on how to use the fire extinguisher d. Tips on how to react in an emergency with all 5 sections.				
At-home activities	- Show the handbook to your parents/adults in your community. - Make changes to your fire safety handbooks based on feedback from your classmates and elders. - Carry the following to class: Old clothes/blankets/pillow covers, sand (enough to fill in the blanket), thread and needle.				
Numeracy Extension	Metaphors and Similes: - Metaphors and similes are two types of figures of speech. - A figure of speech is a creative way of using language to make our writing more engaging and create an impact on readers. - We often see figures of speech being used a lot in poetry. - Let us understand what a simile is and what a metaphor is! - Both these figures of speech are used to compare things! <table border="1"> <thead> <tr> <th data-bbox="414 1207 933 1302">Simile</th> <th data-bbox="950 1207 1461 1302">Metaphor</th> </tr> </thead> <tbody> <tr> <td data-bbox="414 1302 933 1774"> Compares two different things. Something is like or as something else.  For example: • He was as quiet as a mouse. • She swam like a fish.  </td> <td data-bbox="950 1302 1461 1774"> Compares two different things. Something is something else.  For example: • Ali is a walking dictionary. • Time is money.  </td> </tr> </tbody> </table>	Simile	Metaphor	Compares two different things. Something is like or as something else.  For example: • He was as quiet as a mouse. • She swam like a fish. 	Compares two different things. Something is something else.  For example: • Ali is a walking dictionary. • Time is money. 
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	- Fire is very commonly used in similes and metaphors! - Can you think of an emotion or quality you would compare with fire? (examples can include heat, anger, brightness, redness, danger etc.) - Often, in writing, fire is used to express: - Passion and speed: She got all the work done in less than a day. She was on fire. Or As the deadline drew close it was like a fire was lit under him. - Anger: Her eyes were on fire. or His eyes were red as fire. - Something that spreads quickly: The news spread like wildfire. - Brightness: Her hair was a fire or Her hair was as red as fire. - Love: A fire burned in her heart when she saw the prince. - Based on this, work with a partner to come up with a short poem about a person, place, animal or thing. - Make sure to use at least 1 simile and 1 metaphor related to fire in the poem.
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Day 5 -

Today, you will plan on how you wish to present you handbooks and kits to your friends and family and present them!

Time	Activity and Description
10 minutes	Planning for the Presentation: 1. Put all your materials together, this includes the handbook and the fire extinguisher and blankets. 2. Make sure you have clear steps and instructions written down for the drill as well as on using the extinguisher. Note: Get learners to bring friends and family to the class for this part of the project to act as an audience of the presentation.
20 minutes	Presentation Present your handbook and fire extinguisher to your family!
10 minutes	Reflection: - Do you feel more confident on dealing with fires now? Why or why not? - What did you enjoy about this project and why? - What did you not enjoy and why?

Additional enrichment activities:	If there is a fire brigade in your community, invite a firefighter to give a talk to the learners about fire safety procedures.
Modifications for simplification	If all the materials for a fire extinguisher are not easily available, you can simply focus on the creation of the fire safety blanket as part of the kit.

ASSESSMENT CRITERIA

A majority of my learners were able to:

- ☐ Create accurate maps of the building and efficient evacuation plans.
- ☐ Create complete and coherent fire safety handbooks.
- ☐ Explain what combustion is and what combustible substances are.
- ☐ List which factors are necessary for combustion.
- ☐ Create usable fire safety blankets.

APPENDIX

Appendix 1

Video Combustion Needs Heat Experiment

<https://www.instagram.com/reel/CtSYsYrrLn8/?igshid=MzRIODBiNWFIZA==>

Appendix 2

Video for DIY Fire Extinguisher

https://www.youtube.com/watch?v=hJFyl2iGWxs&t=51s&ab_channel=ChampakWorld
