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| **SCIENCE EDUCATION PLANNER: FIRE** |
| **SCIENCE STRANDS:**Living WorldMaterial World | Physical World Plant Earth and Beyond | **MAIN IDEA:** Identify and describe the effects of fire and understand how having a scientific understanding of fire can help us make decisions that can reduce and prevent the effects of fire.  | **LEVEL:** 1 2 3 4**YEAR:** 5 & 6**TEACHER:** Barbara Ryan |
| Nature of Science – understanding, investigating, communicating and participating and contributing. |
| **STRANDS/AOs:** | * Properties and changes of matter – compare chemical and physical changes during combustion.
* Chemistry and society – issues around the use of chemical fire retardants.
* Physical inquiry and physics concepts – exploring and describing heat energy.
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| **KEY COMPETENCIES:** * Thinking – using scientific evidence and knowledge of fire to understand fire and to make decisions relating to keeping safe.
* Language – using scientific language related to fire and its effects.
* Managing self – students become aware of fire safety, both in relation to experiments in class and everyday living.
* Relating to others – listening, discussing and debating ideas while appreciating others’ viewpoints within groups and in class.
* Participating and contributing – working together in investigating activities and New Zealand research and in subsequent discussion.
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| **INTENDED LEARNING OUTCOMES:** The students will: |
| **Conceptual LOs** | **Procedural LOs** | **Nature of science** | **Technical LOs** |
| Students will understand that:* fire is a chemical reaction
* heat energy is the result of the movement of tiny particles in solids, liquids and gases
* smoke is a collection of tiny unburned particles
* fires behave differently depending on a number of different factors such as fuel, weather, oxygen concentrations and terrain shape.
 | Students will be able to:* research science ideas about fire using the Science Learning Hub, the internet and books
* investigate fire by setting up and carrying out some simple experiments and activities
* use their own ideas and ideas of others to make testable predictions
* evaluate investigations and report back to the class
* participate in an ethics discussion concerning fire issues.
 | Students will understand and appreciate that scientists:* use science knowledge (of fire) to keep ourselves safe
* use models to learn about some aspects of science when it is difficult to work with the actual thing, for example, fire and molecules
* often get involved with societal issues that involve the focus of their study, for example, the production of fire-retardant chemicals and effects on society.
 | Students will be able to:* make detailed observations
* carry out simple experiments in groups in a safe manner
* strike a match and light and extinguish a candle
* develop debating skills.
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| **MANAGEMENT/MATERIALS:*** **Resources:** Hub resources, the internet, National Library and school library books.
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| **ASSESSMENT ACTIVITY EXAMPLES:*** Describe some ways of putting out fire and explain why this would work.
* **Transactional report:** Should the government make chemical fire retardants in furniture a regulation in New Zealand? Why or why not?
* **Transactional report:** Nancy Jones is building a new movie theatre in town. She is unsure whether or not to use seating that has been treated with chemical fire retardants. What would you recommend? Why/why not?
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| **SCIENCE: PLANNING FOR TEACHING AND LEARNING: FIRE** |
| **MAIN IDEA:** Identify and describe the effects of fire and understand how having a scientific understanding of fire can help us make decisions that can reduce and prevent the effects of fire. |

| **Micro task** | **Resources** | **Planned****interactions** | **Intended learning****outcomes** | **Reflections** |
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| **MESO TASK:** To understand what fire is and how heat energy is involved in the combustion process. |
| Understand that fire is a chemical reaction (and that heat energy is involved in the process) using drama as a learning medium. | * Image of fire.
* Activity [Drama in the microworld](https://www.sciencelearn.org.nz/resources/774-drama-in-the-microworld).

**Teacher reference:*** Articles: [What is fire?](https://www.sciencelearn.org.nz/resources/747-what-is-fire)
* [Heat energy](https://www.sciencelearn.org.nz/resources/750-heat-energy).
 | * Show image.
* Brainstorm: What is fire?
* What do you think is making the fire happen?
* Follow instructions in Drama in the microworld.
 | Students will understand that fire is a chemical reaction and will appreciate the process in terms of what is happening to the molecules involved. |  |
| Use a candle to observe the effects of combustion. | * Activity: [Light a candle](https://www.sciencelearn.org.nz/resources/775-light-a-candle).

**Teacher reference:*** Article: [What is smoke?](https://www.sciencelearn.org.nz/resources/748-what-is-smoke)
 | * Follow instructions in Light a candle.
 | Students will: * see the effects of combustion – developing ideas about the combustion process (solid becoming liquid becoming a volatile gas)
* have an understanding of what smoke is.
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| Use knowledge of the fire triangle to extinguish fire. | * Activity: [Putting out the fire](https://www.sciencelearn.org.nz/resources/777-putting-out-the-fire).
 | * Follow instructions in Putting out the fire.
 | Students become familiar with the fire triangle and with four ways to extinguish fire. |  |
| **MESO TASK:** To have an understanding of how and why fire behaves differently. |
| Understand the surface area of fuel is an important factor for combustion – shown, in this case, by lighting flour in two different ways. | * Activity: [Exploding flour](https://www.sciencelearn.org.nz/resources/779-exploding-flour).

**Teacher reference:*** Article: [Fire behaviour](https://www.sciencelearn.org.nz/resources/763-fire-behaviour).
 | * Follow instructions in Exploding flour.
* Discuss/brainstorm what else might affect fire behaviour.
 | Students will appreciate surface area is one of many factors that can affect fire behaviour. |  |
| Identify other factors that affect fire behaviour by looking at some New Zealand research of fire in the outdoors. | * Article: [Fire behaviour in the outdoors](https://www.sciencelearn.org.nz/resources/763-fire-behaviour).
* Video: [Project FuSE](https://www.sciencelearn.org.nz/videos/372-project-fuse).
 | * Students read Fire behaviour in the outdoors in groups.
* Discuss and write up factors that affect fire behaviour.
* Watch Project FuSE.
 | Students will appreciate some of the factors that can influence fire behaviour. |  |
| Identify factors that affect fire behaviour to determine fire risk both in indoor and outdoor settings. (An interactive can be used for outdoor fire risk.) | * Activity: [Fire risk assessment](https://www.sciencelearn.org.nz/resources/792-fire-risk-assessment)
* Interactive: [Rural fire risk](https://www.sciencelearn.org.nz/embeds/14-rural-fire-risk)
 | * Follow instructions in Fire risk assessment.
* Students use the interactive on the site as part of this activity.
 | Students will identify and define fire risks both in the indoors and outdoors. |  |
| **MESO TASK:** To develop critical thinking in fire science – making ethical decisions based on science knowledge. |
| Discuss and determine whether or not chemical fire retardants should be added to furniture. | * Activity[: Ethics in Fire Science](https://www.sciencelearn.org.nz/resources/795-ethics-in-fire-science)

**Also use articles and video:** * [Chemical fire retardants](https://www.sciencelearn.org.nz/resources/765-chemical-fire-retardants)
* [Slowing the burning](https://www.sciencelearn.org.nz/resources/739-slowing-the-burning)
* [Slowing down fire](https://www.sciencelearn.org.nz/videos/367-slowing-down-fire)
 | * Follow instructions in Ethics in Fire Science.
 | Students use fire knowledge/context to: * develop critical thinking
* discuss/debate various viewpoints within an ethics context
* make an ethics-based decision.
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