# Fresh Air Innovators Stage 3 STEM program

Fresh Air Innovators STEM program is designed for Stage 3 students, with a focus on air quality and bushfire management. It consists of 8 lessons of approximately 1 hour to be spread over a term. Each lesson empowers students with hands-on STEM activities and real-world skills. The program equips students with the means to tackle environmental challenges, build resilience and make a positive impact in their schools and communities.

Created in collaboration with environmental scientists, education specialists, teachers, Aboriginal and Torres Strait Islander knowledge holders and entrepreneurial professionals, this program combines scientific inquiry, cultural knowledge and innovative problem-solving.

View the website www.freshairinnovators.com.au for all resources outlined in this program.

### Assessment overview

The program incorporates a variety of assessment strategies to support learning. Throughout the program, students use their learning journals to respond to formative assessment questions, with opportunities for self-assessment and teacher feedback on work samples and participation in discussions. Comprehensive teacher assessment and student self-assessment rubrics are provided for the final 2 lessons.

#### **Outcomes - Current NSW syllabus (until 2027)** Outcomes - 2024 NSW syllabus (to be implemented by 2027) **Science and Technology** • ST3-1WS-S: Plans and conducts scientific investigations to answer Science and technology • ST3-SCI-01: Uses evidence to explain how scientific knowledge can questions, including fair testing. • ST3-2DP-T: Plans and uses materials, tools, and equipment to be used to develop sustainable practices. develop solutions for a need or opportunity. • ST3-PQU-01: Poses questions to identify variables and conducts • ST3-3DP-T: Defines problems, and designs, modifies and follows fair tests to gather data. algorithms to develop solutions. • ST3-DAT-01: Interprets data to support explanations and • ST3-8PW-ST: Explains how energy can be transformed from one arguments. • ST3-DDT-01: Uses design processes to create, evaluate and modify form to another. • ST3-4LW-S: Examines how the environment affects the growth, designed solutions. survival and adaptation of living things. • ST3-11LW: Describes some physical conditions of the environment HSIE and how these affect the growth and survival of living things.

### Geography

- GE3-1: Describes the diverse features and characteristics of places and environments.
- GE3-2: Explains interactions and connections between people, places and environments.
- GE3-3: Compares and contrasts influences on the management of places and environments.

### History

- HT3-1: Describes and explains the significance of people, groups, places and events to the development of Australia.
- HT3-2: Describes and explains different experiences of people living in Australia over time.
- HT3-3: Identifies and describes change and continuity and describes the causes and effects of change on Australian society.

## Mathematics (2022, current)

- MAO-WM-01 Working mathematically: develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly.
- MA3-DATA-01: Constructs graphs using many-to-one scales
- MA3-DATA-02: Interprets data displays, including timelines and line graphs.

#### **PDHPE**

- PD3-2: Investigates information, community resources and strategies to demonstrate resilience and seek help for themselves and others.
- PD3-7: Proposes and implements actions and protective strategies that promote health, safety, wellbeing and physically active spaces.

- HS3-ACH-01: Describes Aboriginal Knowledges and Practices that care for Country and the importance of Aboriginal Languages revival.
- HS3-GEO-01: Examines global citizenship and how people organise, protect and sustainably use the environment, using geographical information.

### Mathematics (2022, current):

- MAO-WM-01 Working mathematically: develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly.
- MA3-DATA-01: Constructs graphs using many-to-one scales.
- MA3-DATA-02: Interprets data displays, including timelines and line graphs.

#### **PDHPE**

- PH3-IHW-01: Examines and explains factors that influence identity, health and wellbeing of individuals and groups.
- PH3-SMI-01: Evaluates and applies self-management and interpersonal skills in a range of contexts.
- PH3-CWT-01: Creates written texts to communicate understanding of health, safety and wellbeing.

# Lesson 1 - Power up! Explore energy and renewable solutions

In this lesson students explore energy transfer and transformation, including renewable and non-renewable sources. Through the Energy Transformers game, they tackle real-world challenges like reducing emissions and improving air quality. The lesson encourages students to think critically, generate higher-order questions, and contribute to the class question parking lot for further discussion.

Outcomes (current)	Outcomes (new)	Teaching and learning sequence	Assessment	Resources
ST3-8PW-ST:	ST3-SCI-01: Uses	Learning intention	Question parking	Student devices
Explains how	evidence to	We're learning how energy can be transferred and	lot	with Energy
energy is	explain how	transformed.	Assess students'	Transformers app
transformed from	scientific	Success criteria	contributions to	Question parking
one form to	knowledge can be	<ul> <li>We understand that energy exists in different forms.</li> </ul>	the question	lot space in
another.	used to develop	<ul> <li>We understand that energy can be transferred</li> </ul>	parking lot in	classroom
	sustainable	(moved) or transformed	terms of their	Sticky notes for
	practices.	(changed).	ability to think	question parking
GE3-3: Compares		We can identify renewable and non-renewable	critically about	lot; at least 3 per
and contrasts	HS3-GEO-01:	energy sources.	energy sources	students (may
influences on the	Examines global	We can describe the impact of using renewable and	and how these	need additional
management of	citizenship and	non-renewable energy	sources affect the	Blu Tack or sticky
places and	how people	sources on humans and the environment.	environment.	tape)
environments.	organise, protect			
	and sustainably	Students are guided through slide presentation part 1:	Observation /	
	use the	Introduction	questioning	
PD3-2:	environment,	Students think pair share about what objects relating	Observe student	
Investigates	using	to energy have in common	engagement with	
information,	geographical	Students view a video clip on Dr. Nij who introduces	the Energy	
community	information.	the program	Transformers	
resources and			game. Ask	
strategies to	PH3-IHW-01:	Students are guided through slide presentation part 2:	questions to check	
demonstrate	Examines and	Types of energy	understanding	
resilience and	explains factors	<ul> <li>Students are introduced to how energy can be</li> </ul>	during or after	
seek help for	that influence	transferred and transformed, and how some energy	playing. These	
	identity, health	is renewable and other energy is non-renewable	could include	

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themselves and others.	and wellbeing of individuals and groups.	<ul> <li>As a class, students explore and classify types of energy</li> <li>Engage with Video 2: Dr Nij on ABC Education</li> <li>Students view video to further explore renewable energy</li> <li>Students are guided through slide presentation part 3: Energy Transformers</li> <li>Students are guided on how to play the Energy Transformers game and how this relates to learning about Energy.</li> </ul>	questions such as: What examples of renewable and non-renewable energy are there in the game? What challenge in the game have you found most interesting so far, and why? What's 1 thing you learned about reducing
		Students engage with Energy Transformers game on individual devices	greenhouse emissions?
		Students are guided through presentation part 4: Introduction to learning journal      Students are introduced to the learning journal      Students are provided with selection of questions to respond to, and an example WAGOLL      Students complete own entry in their journal	Exit slip prompt Write down 1 thing you learned about renewable energy today.  Learning journal

# Lesson 2 - The first scientists: Explore Aboriginal and Torres Strait Islander sustainable practices

In this lesson students explore Aboriginal and Torres Strait Islander Peoples' sustainable land management, focusing on cultural burning. They'll learn with DeadlyScience, compare fire types using a Venn diagram, and connect Aboriginal and Torres Strait Islander Peoples' knowledge to modern environmental challenges through videos and interactive activities.

Outcomes (current)	Outcomes (new)	Teaching and learning sequence	Assessment	Resources
ST3-4LW-S: Examines how	ST3-SCI-01: Uses evidence to			Worksheet: First scientists

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the environment	explain how	We're learning how Aboriginal and Torres Strait Islander	Look at how	Worksheet: Types
affects the	scientific	Peoples' sustainable practices protect the environment.	accurately	of fires
growth, survival,	knowledge can be		students	
and adaptation of	used to develop	We can describe Aboriginal and Torres Strait Islander	categorise	
living things.	sustainable	Peoples' science practices.	features of	
	practices.	We can describe the difference between types of	bushfires,	
ST3-11LW:		fires and how they affect the environment.	controlled burns	
Describes some	HS3-ACH-01:		and cultural burns.	
physical	Describes		Use this as an	
conditions of the	Aboriginal	Students are guided through slide presentation part 1:	opportunity to	
environment and	Knowledges and	Introduction	check for	
how these affect	Practices that	Students recap on last lesson	misconceptions	
the growth and	care for Country	<ul> <li>Students are guided to explore the concept of</li> </ul>	and provide	
survival of living	and the	Aboriginal and Torres Strait Islander Science	clarification.	
things.	importance of	Students are introduced to Corey Tutt from		
	Aboriginal	DeadlyScience and guided to think how they can		
	Languages	relate to Aboriginal and Torres Strait Islander Science	Participation in	
GE3-2: Explains	revival.		discussions	
interactions and		Engage with Video 1: Corey Tutt of DeadlyScience	Observe student	
connections	HS3-GEO-01:	<ul> <li>View a video of Corey Tutt, the inspirational STEM</li> </ul>	discussions and	
between people,	Examines global	champion behind DeadlyScience	listen for their	
places, and	citizenship and		ability to explain	
environments.	how people	Students complete worksheet: First scientists	cultural burning's	
	organise, protect	<ul> <li>Students use their knowledge from earlier</li> </ul>	benefits and how	
GE3-3: Compares	and sustainably	presentations and video to reflect on examples of	it differs from	
and contrasts	use the	Aboriginal and Torres Strait Islander Science	hazard reduction	
influences on the	environment,		burning and	
management of	using	Students are guided through slide presentation part 2: Fire:	bushfires.	
places and	geographical	Friend or foe		
environments.	information.	<ul> <li>Students are guided to identify situations where fire</li> </ul>		
		may be considered a friend or foe	Exit slip	
	PH3-IHW-01:	Students explore the concept of bushfires, and are	Explain 1 way that	
HT3-1: Describes	Examines and	guided to identify if they are on bushfire prone land	cultural burning	
and explains the	explains factors	Students explore and discuss the effects of bushfires	helps protect	
significance of	that influence	<u>'</u>	ecosystems. Or	
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people, groups, places, and events to the development of Australia.  HT3-2: Describes and explains different experiences of people living in Australia over time.	identity, health and wellbeing of individuals and groups.	<ul> <li>Students engage with maps and information on the 2019-2020 Black Summer bushfires</li> <li>Students are introduced to the concept of Hazard reduction burns</li> <li>Students are introduced to Vince Scott from DeadlyScience</li> <li>Engage with Video 2: Cultural burns         <ul> <li>Students learn about cultural burns with Vince Scott from DeadlyScience</li> </ul> </li> <li>Students are guided through presentation part 3: Cultural burning and policy         <ul> <li>Students are engaged in discussions about rules and policies</li> </ul> </li> <li>Engage with Video 3: Joe Morrison explains cultural burning policy         <ul> <li>Students learn from Joe Morrison from the Indigenous Land and Sea Corporation about cultural burning and how it fits into land management today.</li> </ul> </li> <li>Students complete worksheet: Venn diagram: Types of fires         <ul> <li>Students demonstrate their knowledge of the difference between bushfires, hazard reduction burns and cultural burning</li> </ul> </li> </ul>	describe 1 thing you learned about Aboriginal and Torres Strait Islander land management.  Learning journal	
		Students complete worksheet: Venn diagram: Types of fires  • Students demonstrate their knowledge of the difference between bushfires, hazard reduction		

## Lesson 3 - Know your backyard: Investigate natural hazards and local environmental management

In this lesson students explore how natural hazard management adapts to climate change. They investigate local fire history using the SEED map database and examine climate impacts on bushfires, floods and droughts. Through the Mt Resilience game, they identify strategies for their community and consider systemic change, disaster resilience and sustainable land management.

Outcomes	Outcomes (new)	Teaching and learning sequence	Assessment	Resources
ST3-4LW-S:	ST3-SCI-01: Uses	Learning intention	Discussion	Devices for SEED
Examines how	evidence to	We're learning to investigate our local environment and	Engage students in	map online
the environment	explain how	explore strategies to manage	class discussions	database and Mt
affects the	scientific	natural hazards sustainably.	about how Vince	Resilience game
growth, survival,	knowledge can be	Success criteria	Scott connects to	
and adaptation of	used to develop	<ul> <li>We can use digital tools to explore local fire history</li> </ul>	Country and how	Worksheet: Local
living things.	sustainable	and environmental features.	they connect to	fire history
	practices.	<ul> <li>We can identify and classify natural hazard</li> </ul>	their own local	
ST3-2DP-T: Plans		management strategies in our	environment.	Earphones
and uses	HS3-ACH-01:	community.	Observe their	(optional) for Mt
materials, tools,	Describes	<ul> <li>We can suggest improvements to existing strategies.</li> </ul>	ability to articulate	Resilience game
and equipment to	Aboriginal		ideas and make	
develop solutions	Knowledges and		connections.	Padlet for class
for a need or	Practices that	Students are guided through slide presentation part 1:		brainstorming;
opportunity.	care for Country	Introduction	Assessment of	free platform, but
	and the	<ul> <li>Students are guided to consider their local</li> </ul>	worksheet	you'll need to set
GE3-1: Describes	importance of	landscapes and how they feel connected to it	Use the worksheet	up an account
diverse features	Aboriginal	Students recap on last lesson	from the SEED	
and	Languages	Students discuss and identify what factors may cause	map exploration	
characteristics of	revival.	changes in landscapes	to assess students'	
places and		<ul> <li>Students are guided to explore examples of natural</li> </ul>	ability to record	
environments.	HS3-GEO-01:	hazards	accurate	
	Examines global		observations and	
GE3-2: Explains	citizenship and	Engage with Video 1: Connecting to country	articulate	
interactions and	how people	<ul> <li>Vince Scott from DeadlyScience explains the</li> </ul>	questions about	
connections	organise, protect	importance of connecting to Country	fire history and	
between people,	and sustainably			

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places, and	use the	Students are guided through slide presentation part 2:	management
environments.	environment,	Exploring our local landscape	strategies.
	using	<ul> <li>Students are guided to reflect on how they can</li> </ul>	
GE3-4: Acquires,	geographical	connect more to their local country	Exit slip
processes, and	information.	<ul> <li>Students are guided through how to use the SEED</li> </ul>	Explain 1 way our
communicates		map database to explore the local fire history of their	local landscape
geographical	PH3-IHW-01:	own local area	has changed over
information using	Examines and		time and the
geographical	explains factors	Students complete worksheet: Venn diagram: Types of fires	impact of this
tools for inquiry.	that influence	<ul> <li>Students reflect and record their findings from the</li> </ul>	change.
	identity, health	SEED map database	
	and wellbeing of		Learning journal
HT3-2: Describes	individuals and	Students are guided through presentation part 3: Weather,	
and explains	groups.	climate and resilience	
different		Students explore the difference between weather	
experiences of	PH3-SMI-01:	and climate and sort conditions into these categories	
people living in	Evaluates and	Students are introduced to the concept of climate	
Australia over	applies	change Students explore the concept of disaster	
time.	self-management		
	and interpersonal		
HT3-5: Applies a	skills in a range of	Engage with Mt Resilience game	
variety of skills of	contexts.	Students independently play Mt Resilience game and	
historical inquiry		are guided to reflect on management strategies used	
and	MA3-DATA-02:	in their areas, including individual responsibilities,	
communication.	Interprets data	local, state and national	
	displays,	Students are introduced to the idea of systemic	
MA3-DATA-02:	including	change	
Interprets data	timelines and line		
displays,	graphs.	Students engage with video 2: Harkaway Primary Schools	
including		Students explore a case study of the Resilient	
timelines and line		Australia National School Award	
graphs.			
		Learning journal	
		Students select and respond to learning journal	
		questions to demonstrate their learning	
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## Lesson 4: Invisible invaders: Understanding and measuring air pollution

In this lesson students explore air pollution sources, impacts, and monitoring. They investigate fine particulate matter (PM) known as PM2.5 and its effects on human health and the environment, and sort pollution sources. Using the Air Quality NSW website, they analyse real-time data and distinguish correlation from causation. Finally, students collect PM2.5 data around their school to identify pollution hotspots and possible sources.

Outcomes	Outcomes (new)	Teaching and learning sequence	Assessment	Resources
ST3-1WS-S: Plans and conducts scientific investigations to answer questions, including fair testing.	ST3-SCI-01: Uses evidence to explain how scientific knowledge can be used to develop sustainable practices.	Learning intention  We're learning about the impacts of pollution on humans and the environment.  Success criteria  We can describe sources of pollution.  We can describe the impacts of pollution.  We can measure pollution in our environment.	Assessment of data analysis worksheet Use the worksheet to assess how well students recorded and analysed PM2.5 data.	Charged air pollution monitors  Access to outdoor areas  Worksheet: Local sources of PM2.5
ST3-2DP-T: Plans and uses materials, tools, and equipment to develop solutions for a need or opportunity.  ST3-4LW-S: Examines how the environment affects the growth, survival	ST3-DAT-01: Interprets data to support	<ul> <li>Students are guided through slide presentation part 1: Introduction</li> <li>Students recap on last lesson</li> <li>Students are guided to learn about pollutants through exploring diagrams, think, pair, share activities and filling the blanks</li> <li>Students are introduced to the term 'particulate' and are guided to learn about the size and impact of these</li> <li>Students complete worksheet: Local sources of PM2.5 pollution</li> <li>Students sort sources of PM2.5 pollution according to how likely they think they'll affect their local environment.</li> </ul>	Group discussions Discuss as a group why some areas of the school had higher or lower PM2.5 readings.  Exit slips What is PM2.5 and why is it important for us to measure it? What was the most surprising result from your measurements today?	

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	and wellbeing of		
03-7: Proposes	individuals and		
nd implements	groups.		
ctions and			
rotective			
trategies that			
romote health,			
afety, wellbeing			
nd physically			
ctive spaces.			

## Lesson 5: Breathe easy: Monitor and reduce carbon dioxide in the classroom

In this lesson students explore carbon dioxide (CO2) and its impact on human health and the environment. Using an air pollution monitor to measure CO2, they assess classroom levels and conduct an experiment to investigate its properties. They analyse data to understand how CO2 impacts indoor air quality.

Outcomes	Outcomes (new)	eaching and learning sequence	Assessment	Resources
ST3-1WS-S: Plans and conducts scientific investigations to	ST3-PQU-01: Poses questions to identify variables and	earning intention /e're learning how to monitor and manage nderstand its npact on our health and environment.	Observe students' ability to set up an	1 bottle of carbonated soft drink per group of 4-6
answer questions, including fair testing.	conducts fair tests to gather data. ST3-DAT-01:	<ul> <li>We can describe CO2 and how it affer environment and human health.</li> <li>We can use and interpret data from monitor.</li> </ul>	prompt questions such as: 'What is the 1 thing you are	
ST3-2DP-T: Plans and uses materials, tools,	Interprets data to support explanations and	We can suggest actions to lower level	(independent variable); 'What	group of 4-6  1 air pollution
and equipment to develop solutions for a need or	PH3-IHW-01:	tudents are guided through slide presenta ntroduction <ul><li>Students recap on last lesson</li></ul>	tion part 1: are you measuring? (dependent	monitor per group of 4-6
opportunity.	Examines and explains factors that influence	<ul> <li>Teachers drop 3 pre-prepared ballog CO2 from soda water bottle, 1 filled</li> </ul>		1 or more small car-sized spaces per group of 4-6

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ST3-11PW-ST:	identity, health,	1	1 filled with air from balloon pump) and guide	(controlled	DivII:- CO2
Explains how	and wellbeing of	1	students through questions in presentation	variables).	Birdie CO2
energy can be	individuals and	1	Students are guided through the experiment set-up		monitor for the
	groups.	1	in groups, where they fill their own balloons like the	Worksheet	classroom
one form to		1	demonstration ones, and repeat their own	Assess students'	
another.	PH3-SMI-01:	1	experiment	ability to	Kookie stickers for
	Evaluates and	1	Students are guided through the concept of fair	accurately record	Birdie CO2
PD3-7: Proposes	applies	1	testing and variables in their experiment	and interpret data.	monitor
and implements	self-management	• :	Students are led through experiment discussion and		
actions and	and interpersonal		encouraged to make real-world connections	Exit slip	Worksheet: CO2 in
protective	skills in a range of			What is 1	enclosed spaces
strategies that	contexts.	Studen	ts are guided through slide presentation part 2: CO2	important thing	
promote health,		in enclo	osed spaces	you learned about	
safety, wellbeing.	MAO-WM-01:	• :	Students engage in discussion on how CO2 can build	CO2 and its impact	
and physically	Working		up in enclosed spaces such as cars	on the	
active spaces.	mathematically:	• :	Students are guided how to set up a group-work	environment or	
	develops		experiment on how COS builds up in enclosed	human health?	
MAO-WM-01:	understanding	!	spaces, applying their knowledge of variables and fair		
Working	and fluency in	1	testing	Learning journal	
mathematically:	mathematics				
develops	through exploring	Studen	ts engage in worksheet: CO2 in enclosed spaces		
understanding	and connecting	• :	Students use air pollution monitors and work in		
and fluency in	mathematical		groups to conduct their experiment		
mathematics	concepts,				
through exploring	choosing and	Studen	ts are guided through slide presentation part 3: CO2		
and connecting	applying	in our c	classroom		
mathematical	mathematical	• :	Students are introduced to the 'Birdie' CO2 monitor,		
concepts,	techniques to		discussing what is measures and what this means		
choosing and	solve problems,	• :	Students are guided to convert 'Birdie' into 'Kookie'		
applying	and		using provided stickers		
mathematical	communicating	• :	Students use the 'letsair stimulator to estimate how		
techniques to	their thinking and		classroom CO2 might change depending on various		
solve problems,	reasoning	1	factors		
and	coherently and				
communicating	clearly.	Learnin	ng journal		
Communicating	cicarry.	Learnin	is journal		

their thinking and reasoning coherently and clearly.	MA3-DATA-01: Constructs graphs using many-to-one	Students select and respond to learning journal questions to demonstrate their learning	
MA3-DATA-01: Constructs	scales.		
graphs using	MA3-DATA-02:		
many-to-one	Interprets data		
scales.	displays, including line		
MA3-DATA-02:	graphs.		
Interprets data displays,			
including line			
graphs.			

## Lesson 6: Filter heroes: Assemble and test HEPA filters to improve air quality

In this lesson students investigate HEPA filters and their role in improving air quality. They construct a HEPA filter and conduct an experiment measuring PM2.5 levels before and after burning incense. Using air pollution monitors to measure PM2.5, they compare data with the HEPA filter on and off to test its effectiveness. The lesson promotes critical thinking and real-world application by exploring ways to improve indoor air quality.

Outcomes	Outcomes (new)	Teaching and learning sequence	Assessment	Resources
ST3-1WS-S: Plans and conducts scientific investigations to answer questions, including fair testing.	ST3-SCI-01: Uses evidence to explain how scientific knowledge can be used to develop sustainable practices ST3-PQU-01: Poses questions	<ul> <li>Learning intention</li> <li>We're learning how to monitor and clear our classroom of particulate matter.</li> <li>Success criteria <ul> <li>We can construct a HEPA filter and use it to improve air quality.</li> <li>We can measure PM2.5 levels using air pollution monitors, interpret their data, and</li> <li>evaluate the effectiveness of HEPA filters.</li> </ul> </li> </ul>	Experiment observation Observe students' ability to set up an experiment as a fair test. Ask prompt questions such as: 'What is the 1 thing you are changing?'	<ul><li>1 HEPA filter kit per group</li><li>1 magnifying glass per group</li><li>1 set of HEPA filter assembly instructions per group</li></ul>

ST3-2DP-T: Plans	to identify			(independent	
and uses	variables and	  Students	s are guided through slide presentation part 1:	variable); 'What	1 incense stick per
materials, tools,	conducts fair	Introduct		are you	group
and equipment to		l	tudents are presented with a mystery object (a part	measuring?	9. oab
develop solutions	data.	I	f a HEPA filter) and asked to explore with a	(dependent	1 incense stick
for a need or	data	l	nagnifying glass and suggest what it is, and what it	variable); and	holder per group
opportunity.	ST3-DAT-01:	I	night do	'What are you	p 6. eab
	Interprets data to	1	tudents recap on last lesson	keeping the same?	1 air pollution
MAO-WM-01:	support	1	tudents are guided to learn about what a HEPA filter	(controlled	monitor per group
Working	explanations and	I	and how it works	variables). Based	1 11 11 11 11 11
mathematically:	arguments.			on feedback from	2 long-handled
develops		Students	s are guided through slide presentation part 2:	the previous	oven lighters per
understanding	MAO-WM-01:	1	ent: clearing the air	lesson, students	group (one for use
and fluency in	Working	• St	tudents are reminded about PM2.5 and how to	should be more	by teacher, one as
mathematics	mathematically:	l m	neasure it	confident in their	back up)
through exploring	develops	• St	tudents are guided to construct the HEPA filters in	responses.	
and connecting	understanding	gr	roups		Cup or small
mathematical	and fluency in	• St	tudents are guided through setting up the HEPA	Worksheet /	container of water
concepts,	mathematics	fil	lter experiment, about fair testing and variables	presenting	for each group to
choosing and	through exploring	● St	tudents are taught how to record their data on their	findings	extinguish incense
applying	and connecting	gr	raph and discuss their results	Assess students'	
mathematical	mathematical			ability to	1 timer or stop
techniques to	concepts,	Students	s engage in worksheet: Clearing the air	accurately record	watch per group
solve problems,	choosing and	1	tudents conduct their experiment in groups, record	and interpret data.	
and	applying	ar	nd analyse their data	Students could	Have on hand a
communicating	mathematical			present their	mask for each
their thinking and	techniques to	Learning		findings to the	student if they
reasoning	solve problems,	1	tudents select and respond to learning journal	class. Students	would like to wear
coherently and	and	qı	uestions to demonstrate their learning	summarise the	one
clearly.	communicating			experiment in 1	
	their thinking and			sentence,	1 experiment
MA3-DATA-01:	reasoning			including key	worksheet for
Constructs	coherently and			terms like 'burning	each student:
graphs using	clearly.			incense', 'PM2.5	Clearing the air

many-to-one	MA3-DATA-01:	levels' and 'HEPA
cales.	Constructs	filter'.
, c ב וג	graphs using	Initer.
//A3-DATA-02:	many-to-one	Evit clip prompts
	scales.	Exit slip prompts What is 1 thing
nterprets data	Scales.	
lisplays,	MAAR DATA OR.	you learned about
ncluding line	MA3-DATA-02:	HEPA filters today?
raphs.	Interprets data	What questions do
	displays,	you still have
PD3-2:	including	about air quality
nvestigates	timelines and line	or PM2.5?
nformation,	graphs	
community		Learning journal
esources and	PH3-IHW-01:	
trategies to	Examines and	
demonstrate	explains factors	
esilience and	that influence	
seek help for	identity, health	
hemselves and	and wellbeing of	
thers.	individuals and	
	groups.	
D3-7: Proposes		
ind implements		
actions and		
orotective		
strategies that		
romote health,		
afety, wellbeing		
nd physically		
active spaces.		
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# Lesson 7: Fresh air action plan: Create a classroom environmental management plan

In this lesson students design a classroom environmental management plan. They collaborate to monitor air quality and improve it by managing CO2 and PM2.5 levels. Using data and reasoning, they create a flowchart and assign roles for effective implementation of their

plan. Groups present their plans, receive peer feedback, and refine their ideas, developing critical thinking and teamwork skills whilst creating healthier learning spaces.

Outcomes	Outcomes (new)	Teaching and learning sequence	Assessment	Resources
ST3-2DP-T: Plans	ST3-SCI-01: Uses	Learning intention	Group	Access to
and uses	evidence to	We're learning to create a plan to sustainably manage air	presentations and	flowchart tools:
materials, tools,	explain how	quality in our classroom.	peer feedback	This may include
and equipment to	scientific	Success criteria	Assess how well	blank paper and
develop solutions	knowledge can be	<ul> <li>I can collect, analyse and interpret CO2 and PM2.5</li> </ul>	each group	markers, or digital
for a need or	used to develop	data to identify air quality trends.	explains their plan,	tools such as
opportunity.	sustainable	<ul> <li>I can apply technology and engineering skills to</li> </ul>	including how they	Google Drawings,
	practices.	develop solutions for air quality	use data to justify	the Lucidchart
ST3-3DP-T:		<ul><li>management.</li></ul>	when and why to	add-on for Google
Defines	ST3-DAT-01:	<ul> <li>I can use mathematical reasoning to justify decisions</li> </ul>	use HEPA filters or	Workspace, or
problems, and	Interprets data to	and actions in the	adjust windows.	student access to
designs, modifies	support	<ul> <li>environmental management plan.</li> </ul>	Use the rubric to	Canva or Miro
and follows	explanations and	<ul> <li>I can work collaboratively to present a clear flowchart</li> </ul>	support	
algorithms to	arguments.	outlining responsibilities and	assessment.	Air pollution
develop		<ul><li>solutions.</li></ul>	Assess students'	monitors
solutions.	ST3-DDT-01: Uses		ability to provide	
	design processes		constructive	HEPA filters
GE3-3: Compares	to create,	Students are guided through slide presentation part 1:	feedback using the	
and contrasts	evaluate and	Introduction	'2 stars and a wish'	Birdie classroom
influences on the	modify designed		framework.	CO2 monitor
management of	solutions.	and introduced to environmental management plans	Observe how well	
places and		<ul> <li>Students explore the key components of</li> </ul>	groups	Worksheet:
environments.	HS3-GEO-01:	environmental management plans	incorporate	Classroom
	Examines global	<ul> <li>Students are guided to a 'jigsaw' activity and allocated</li> </ul>		environmental
MAO-WM-01:	citizenship and	roles to start to brainstorm their own group	and improve their	management plan:
Working	how people	classroom environmental management plans	plans.	Planning sheet
mathematically:	organise, protect	<ul> <li>Students are guided on how to create flow charts for</li> </ul>		
develops	and sustainably	their plan, using a medium of their choice (google	Student	Worksheet:
understanding	use the	drawings, Lucidchart, Powerpoint, Canva, Miro, or on	self-assessment	Classroom
and fluency in	environment,	paper)	Students use the	environmental
mathematics	using		self-assessment	

through exploring	geographical	1	Students are led through a WAGOLL example and	rubric to appraise	management plan
and connecting	information.		familiarise themselves with a rubric before creating		jigsaw
mathematical			plans in groups	their classroom	
concepts,	MAO-WM-01:	1	Students are supported to give feedback on other	environmental	Classroom
choosing and	Working	1	group's plans, and to make changes to their own plan	management	environmental
applying	mathematically:	•	Students are supported to either amalgamate their	plans.	management plan
mathematical	develops		plans into one for their classroom, or to vote on one		example
techniques to	understanding	1	to implement	Teacher	
solve problems,	and fluency in	1	Students consider ongoing monitoring of the	assessment	Self-assessment
and	mathematics	1	selected plan	Use the teacher	rubric for
communicating	through exploring	1		rubric to assess	Classroom
their thinking and	and connecting	1	ng journal	students' final	environmental
reasoning	mathematical	1	Students select and respond to learning journal	classroom	management plan
coherently and	concepts,		questions to demonstrate their learning	environmental	
clearly.	choosing and			management	Teacher rubric for
	applying			plans.	Classroom
MA3-DATA-01:	mathematical				environmental
Constructs	techniques to			Learning journal	management plan
graphs using	solve problems,				
many-to-one	and				Post-it notes for
scales.	communicating				classroom
	their thinking and				environmental
MA3-DATA-02:	reasoning				management plan
Interprets data	coherently and				feedback
displays,	clearly.				
including line					Recommendations
graphs.	MA3-DATA-01:				for continuing the
	Constructs				program
PD3-2:	graphs using				
Investigates	many-to-one				
information,	scales.				
community					
resources and	MA3-DATA-02:				
strategies to	Interprets data				
demonstrate	displays,				

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resilience and	including
seek help for	timelines and line
themselves and	graphs.
others.	
	PH3-IHW-01:
PD3-7: Proposes	Examines and
and implements	explains factors
actions and	that influence
protective	identity, health
strategies that	and wellbeing of
promote health,	individuals and
safety, wellbeing	groups.
and physically	
active spaces.	PH3-SMI-01:
	Evaluates and
	applies
	self-management
	and interpersonal
	skills in a range of
	contexts.
	PH3-CWT-01:
	Creates written
	texts to
	communicate
	understanding of
	health, safety and
	wellbeing.
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## Lesson 8: Future innovators: designing entrepreneurial solutions for environmental challenges

In lesson 8 students explore entrepreneurship as a tool for environmental change, guided by Megan Fisher from EnergyLab. They identify local transport issues, brainstorm solutions using 'blue sky thinking,' and develop ideas through storyboarding. Using peer feedback, they refine their innovations, fostering critical thinking and resilience. The lesson empowers students to drive systemic change in their communities.

Outcomes	Outcomes (new)	Teaching and learning sequence	Assessment	Resources
ST3-2DP-T: Plans	ST3-SCI-01: Uses	Learning intention	Entrepreneurship	Optional: Access to
and uses	evidence to	We're learning to identify and solve real-world problems	rubric	digital programs
materials, tools,	explain how	using entrepreneurial thinking and design processes to	Use the	for storyboarding,
and equipment to	scientific	create innovative, sustainable solutions for the environment	entrepreneurship	eg, Canva or
develop solutions	knowledge can be	and society.	rubric to assess	Google slides (can
for a need or	used to develop	Success criteria	key components	be done on paper)
opportunity.	sustainable	<ul> <li>I can identify and explain real-world transport and</li> </ul>	of this lesson.	
	practices.	environmental problems and propose sustainable		Storyboard
ST3-3DP-T:		solutions.	Peer feedback	template
Defines	ST3-DDT-01: Uses	<ul> <li>I can use design processes to develop, evaluate and</li> </ul>	Use the rose, bud,	worksheet
problems, and	design processes	refine creative solutions collaboratively.	thorn activity to	(optional)
designs, modifies	to create,	<ul> <li>I can communicate my ideas effectively through</li> </ul>	assess how	
and follows	evaluate and	writing and visuals, showing their impact on health,	students give and	Rubric - student
algorithms to	modify designed	safety and the environment.	respond to peer	self-assessment
develop	solutions.		feedback. Ask:	
solutions.			What did you learn	Rubric - teacher
	HS3-GEO-01:	Students are guided through slide presentation part 1:	from the feedback	assessment
GE3-2: Explains	Examines global	Introduction	you received? How	
interactions and	citizenship and	<ul> <li>Students are guided to consider why changes and</li> </ul>	did you use	Optional: How to
connections	how people	technology are important	feedback to	prototype guides
between people,	organise, protect	Students explore the pollution issues associated with	improve your	(using tinkercad,
places and	and sustainably	transport	idea?	cardboard, craft
environments.	use the	<ul> <li>Students are introduced to how to think like</li> </ul>		materials, Canva,
	environment,	entrepreneurs and introduced to 2 real life	Prototype	Minecraft)
GE3-3: Compares	using	entrepreneurs: Saul Griffith and Megan Fisher	observation (if	
and contrasts	geographical		doing)	Optional: Recycled
influences on the	information.	Students engage with video 1: Saul Griffith	Observe students	materials, craft
management of		Students listen to Saul Griffith, as a case study of an	as they begin	materials or access
places and	PH3-IHW-01:	entrepreneur	prototyping. Are	to digital programs
environments.	Examines and		they	to create
	explains factors	Students engage with video 2: Megan Fisher, "Entrepreneurs	experimenting	entrepreneurial
PD3-2:	that influence	identify opportunities'	with different	prototypes
Investigates	identity, health		approaches? Are	

information, community resources and	and wellbeing of individuals and groups.	Students are guided to think like entrepreneurs and identify opportunities for transportation solutions in their local area	they iterating based on feedback or challenges?	
strategies to demonstrate resilience and seek help for themselves and	PH3-SMI-01: Evaluates and applies self-management	<ul> <li>Students complete storyboard template</li> <li>Guided by Megan, students complete a storyboard template demonstrating a solution for a transportation problem in their local area</li> </ul>	Learning journal	
others.  PD3-7: Proposes and implements actions and	and interpersonal skills in a range of contexts.  PH3-CWT-01:	Students engage with video 3: Megan Fisher, 'Turning ideas into reality'  • Students are guided to give and seek feedback to improve their ideas		
protective strategies that promote health,	Creates written texts to communicate	Students explore how to turn their ideas into reality  Optional: Students are guided through slide presentation		
safety, wellbeing and physically active spaces.	understanding of health, safety and wellbeing.	<ul> <li>Prototyping</li> <li>Students have the option of building prototypes of their ideas through a variety of media, including Tinkercad, cardboard, craft materials, Canva, Minecraft and can use the downloadable guides for step-by-step support</li> </ul>		
		<ul> <li>Optional: Competition</li> <li>Students may choose to enter the prototypes or storyboards to the Fresh Air Innovators competition.</li> <li>See the competition tab of the website for complete guidelines.</li> </ul>		
		Evaluation       Evaluation       Students select and respond to learning journal questions to demonstrate their learning		

# Fresh Air Innovators resources

If a funded position in the Fresh Air Innovators program is not available, you can still participate by accessing the online resources and purchasing your own hardware and experiment equipment. In addition to the listed materials, students will need access to devices (tablets, computers, or laptops) to engage with online resources. This document serves as a guide for purchasing the recommended resources for each lesson. For advice on recommended retailers, feel free to contact us via the 'contact us' tab in the website.

Lesson	Resource	Recommended quantity	Notes
	Learning journal	1 per student	Any lined workbook
Lesson 1	Post it notes	At least 3 per student	You may need additional blu-tac or sticky tape
Lesson 4	Air pollution monitors	5 for class, to use in groups	We use AirFanta G2 Air Quality Monitors to measure both PM2.5 and CO2
	Carbonated soft drinks (1.1L bottles, ideally soda water)	1 per group	Recommended group size of 4-6 students per group
	Balloon pumps	1 per group	
Lesson 5	Balloons	3 per group, some spare	
	Air pollution monitors (as per lesson 4)	1 per group	
	Birdie CO2 monitors	1 for classroom	See birdie.design for more information
	Birdie 'Kookie' sticker	1 per classroom	Contact us for availability
	HEPA filter set	1 per group	We use AirFanta 3Pro
	Incense sticks	1 per group	
	Incense holder	1 per group	
Lesson 6	Air pollution monitors (as per lesson 4&5)	1 per group	
	Long handled oven lighters	2 for class	Teacher to use one, keep one spare
	Timer / stop watches	1 per group	
	Face masks	1 per student if they would like to wear them	
Lesson 7	Air pollution monitors, HEPA filters, Birdie CO2 monitors	As per previous lessons	
	Post it notes	Approx. 3 per group	
		Enough for each student	Materials may include cardboard, recycled
Lesson 8	Prototype materials	to construct a prototype	materials, craft materials or access to digital
20000110	(optional)	using a material of their choice (optional)	programs to create entrepreneur prototypes (optional)