Teacher Guide

Forest Education Foundation

The stories behind our trees

Inquiry Cubes - Years 3 - 6

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Introduction

The *Inquiry Cubes* are a hands-on metacognitive thinking tool designed and made in Tasmania.

The *Inquiry Cubes* help students to activate their prior knowledge of forests, engage their critical thinking skills and participate in collaborative problem-solving.

The illustrations and vocabulary of the *Inquiry Cubes* reflect the Geography (HASS) and Science content of the Austrlaian Curriculum and cross-curriculum priority of sustainability. They can be used as to provoke a range of inquiries in these subject areas.

FEF's Guiding Questions

The *Inquiry Cubes* also connect with the Forest Education Foundation's four ***Guiding Questions*** (outined below), designed to build upon each other as a scaffolding tool, enabling students to progress from a fundamental awareness to a deeper understanding of forests. See how they can be used to integrate forest literacy from Prep to Year 12 in the *Tasmanian Forest Education Plan*.

Forest Literacy

Inquiry Cubes

Use of the *Inquiry Cubes* supports integration of forest literacy in the classroom, as outlined in the *Tasmanian Forest Education Plan*.

The Plan illustrates how forest literacy can be integrated across the curriculum through teaching and learning.

Forest literacy refers to the knowledge and skills involved in understanding forests and our interactions with these environments.

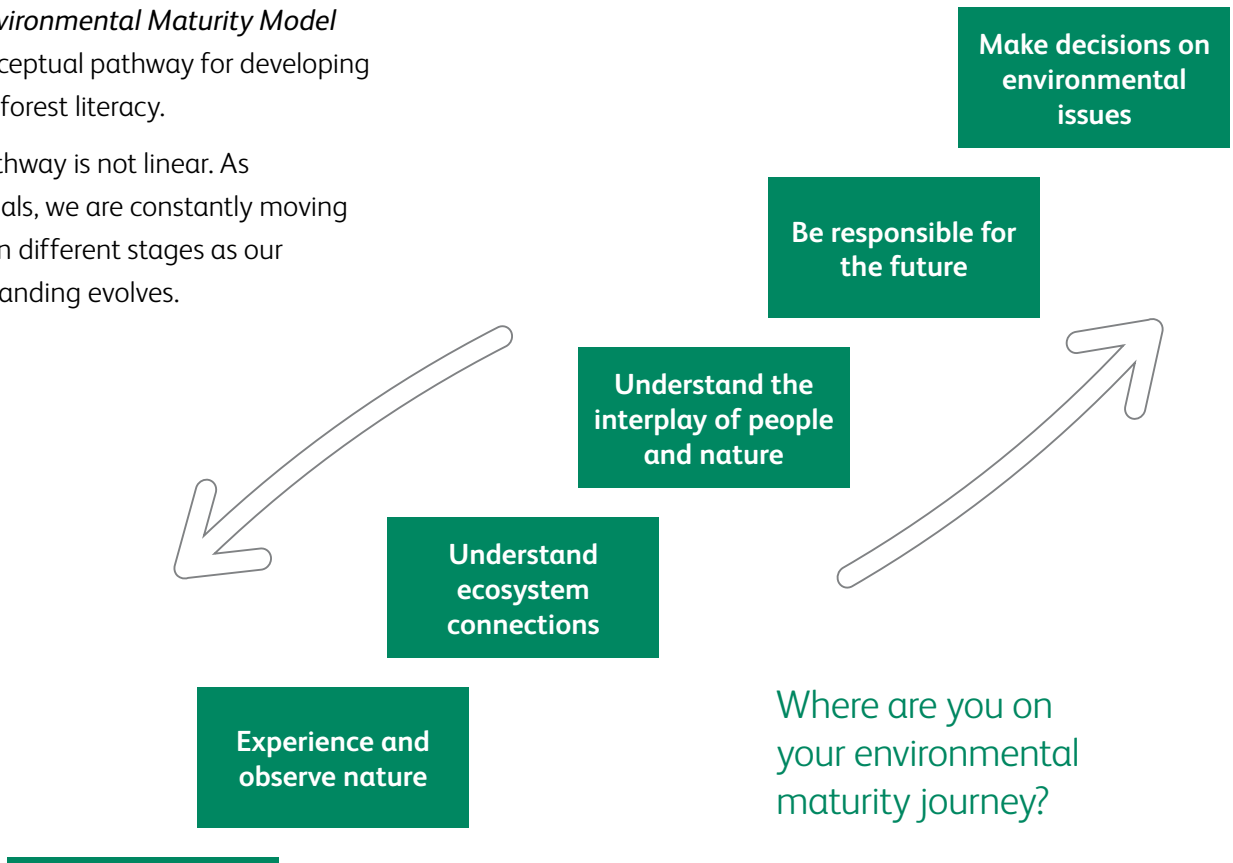
A forest literate individual can use their knowledge and skills to make informed decisions about natural and managed forest landscapes.

Forest literacy enables students to:

- Appreciate our forests and their place in them.
- Understand the ecological web.
- Comprehend the interactions and outcomes of cycles and flows in forest systems.
- Realise their connection and dependence on forest landscapes.
- Recognise the complexities of managing dynamic natural resources for a range of purposes.
- Make informed decisions and act as stewards for the future of forest landscapes and resources.

The *Environmental Maturity Model* is a conceptual pathway for developing greater forest literacy.

This pathway is not linear. As individuals, we are constantly moving between different stages as our understanding evolves.



Where are you on your environmental maturity journey?

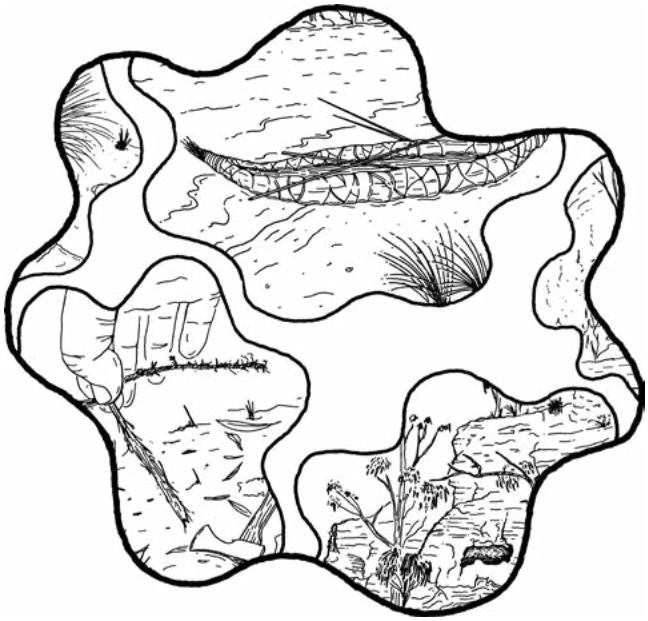
Adapted from: Bjørn Helge Bjørnstad, Forestry Extension Institute, Norway; "Pedagogic steps in environmental maturity", 2013.

Cross Curriculum Priorities

Inquiry Cubes

Themes included in the images of the *Inquiry Cubes* explore the connection between forests, Aborginal and Torres Strait Islander Peoples Culture and History and Sustainability. Interacting with and building understanding of the multiple perspectives towards and values of Tasmanian forests supports students to make balanced judgements in the present and future.

Exploring the diversity of environmental, social and economic values held for forest environments is essential to the sustainable futures for our forests. Engaging with palawa and pakana knowledge of, connections to and cultural practices on forest country enriches our understanding of forest ecosystems and allows Aboriginal students and teachers to see themselves and their cultures reflected in their learning.



Sustainability	Systems	SS1	All life forms, including human life, are connected through Earth's systems on which they depend for their wellbeing and survival.
		SS2	Sustainable patterns of living require the responsible use of resources, maintenance…preservation…restoration of healthy environments.
		SS3	Social, economic and political systems influence the sustainability of Earth's systems.
	World Views	SW2	World views are formed by experiences at personal, local, national and global levels, and are linked to individual, community, business and political actions for sustainability.
	Design	SD1	Sustainably designed products, environments and services aim to minimise the impact on or restore the quality and diversity of environmental, social and economic systems.

Aboriginal and Torres Strait Islander Histories and Cultures	Country/Place	A_TSICP1	First Nations communities of Australia maintain a deep connection to, and responsibility for, Country/Place and have holistic values and belief systems that are connected to the land, sea, sky and waterways.
	People	A_TSIC2	First Nations Australians' ways of life reflect unique ways of being, knowing, thinking and doing.
	Culture	A_TSIP3	The significant and ongoing contributions of First Nations Australians and their histories and cultures are acknowledged locally, nationally and globally.

Curriculum Links

Inquiry Cubes

This resource supports students to interact with the Geography (HASS) curriculum content and cross-curriculum priority of sustainability within a familiar context, forests. The curiosity provoked through initial interaction with this resource can become a platform to explore a wide range of curriculum areas.

Years 3-6

Learning Area	Strand	Code	Content Descriptors
HASS	Geography	AC9HS4K05	The importance of environments, including natural vegetation and water sources, to people and animals in Australia and on another continent.
		AC9HS4K06	Sustainable use and management of renewable and non-renewable resources, including the custodial responsibility First Nations Australians have for Country/Place.
		AC9HS5K04	The influence of people, including First Nations Australians and people in other countries, on the characteristics of a place.
		AC9HS5K05	The management of Australian environments, including managing severe weather events such as bushfires, floods, droughts or cyclones, and their consequences.
	Skills	AC9HS3S03 AC9HS3S04	Analyse information and data, and identify perspectives.
		AC9HS5S03 AC9HS6S03	Evaluate information and data in a range of formats to identify and describe patterns and trends, or to infer relationships.
		AC9HS3S01 AC9HS4S01	Develop questions to guide investigations about people, events, places and issues.
		AC9HS5S01 AC9HS6S01	Develop questions to investigate people, events, developments, places and systems.
Science	Biological Understanding	AC9S3U01	Compare characteristics of living and non-living things and examine the differences between the life cycles of plants and animals.
		AC9S4U01	Explain the roles and interactions of consumers, producers and decomposers within a habitat and how food chains represent feeding relationships.
		AC9S5U01	Examine how particular structural features and behaviours of living things enable their survival in specific habitats.
		AC9S6U01	Investigate the physical conditions of a habitat and analyse how the growth and survival of living things is affected by changing physical conditions.

Inquiry Cubes

Background Information

Content

6. What is a forest?

7. Why are forests important?

8-9. Behind the Illustrations

What is a Forest?

It's a web of life - a dynamic, constantly changing community of living things - from the subsoil to the canopy, a forest is much more than its trees.

A forest is a complex ecosystem characterised by a dominance of tree cover- a living web of many different animal and plant species. No two forests are the same and are a result of the interactions and interdependence between biotic (living) and abiotic (non-living) components of the environment.

Forests play a vital role in sustaining the life forms and atmosphere of our planet. Forests provide a habitat for all the living things contained within them. Beyond the trees, the forest is also made up of soil, water, other plants, animals, birds and insects. Many of these things are dependent on other living and non-living things within the forest for their health and survival.

Why are forests important?

Inquiry Cubes

When we look at a forest landscape what we see is greatly influenced by our understanding of the values associated with forests. Alongside identifying our personal values for these spaces, it is important to recognise the diversity of values which forest landscapes hold. Exploring multiple values increases student understanding of the local, national and global importance of forest landscapes.

Environmental Values

Forests play a vital role in sustaining the life forms and atmosphere of our planet. They help keep our water clean, prevent soil erosion and clear the air we breathe. They are also habitat for a unique range of Tasmanian flora and fauna, helping to sustain biodiversity.

Social and Cultural Values

When asked why forests are important, answers will vary from good health and wellbeing, sense of place, recreation, historical importance, aesthetic values... our connections to forests are diverse and multifaceted.

The social and cultural values of forests are often difficult to define and profoundly personal. Examining a diverse range of individual and community perspectives on forest values helps students to understand why making decisions about our forests can be complex.

Economic Values

Forest services and products are an important component of Tasmania's economy. These can range from employment opportunities, to wood, food and medicine products for global markets. Recognising the importance of forests economically supports students to understand the interconnectedness of the environmental, social/cultural and economic forest systems in Tasmania. Deveoping this understanding supports students in becoming active and informed decision makers who can explore strategies for managing these systems sustainably.

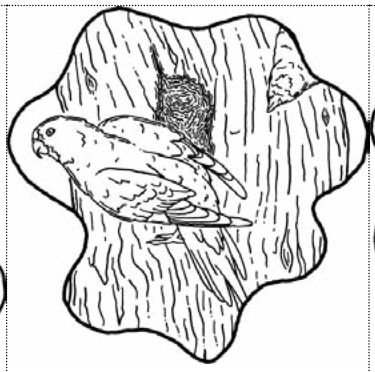
Behind the Illustrations

Inquiry Cubes

Each of the *Inquiry Cubes* has a set of 5 illustrations with a story to tell about the importance of forests. Here you can find a brief description of each image.

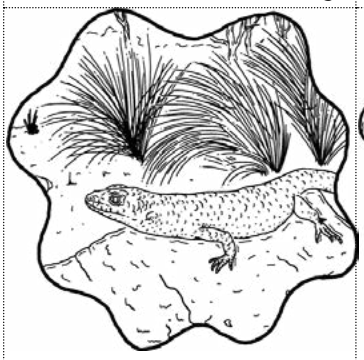
200 year old habitat tree with hollow and fire scarring

Mountain bike rider on forest track in Derby

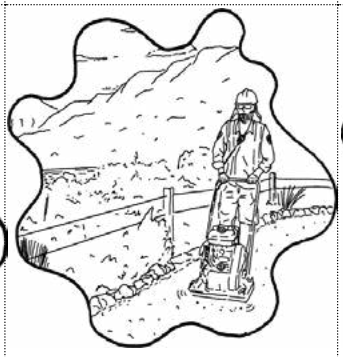


Swift Parrot perched on a tree hollow

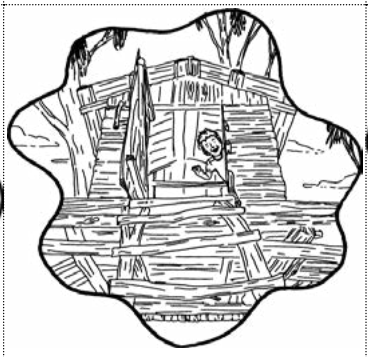
Photographer in a Tasmanian forest



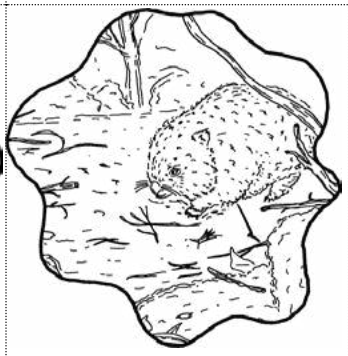
Tasmanian tree skink on grassy forest floor



Park ranger compacting a bushwalking track

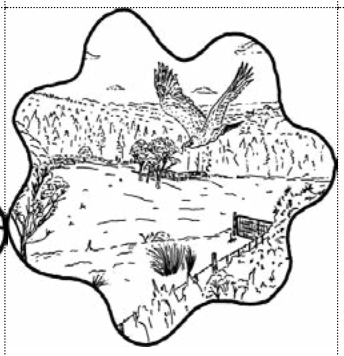


Child playing in a forest treehouse

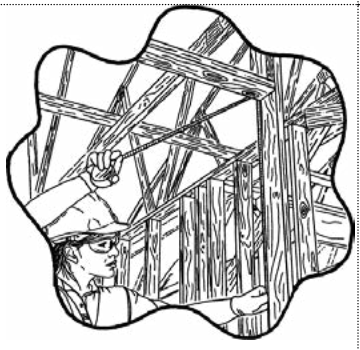


Tasmanian bare-nosed wombat

Aboriginal rope-making with with native grasses



Wedge-tailed eagle above forest farmland

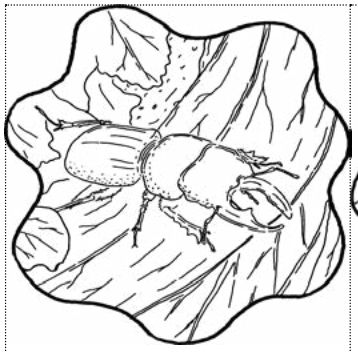


Builder constructing a wooden house frame

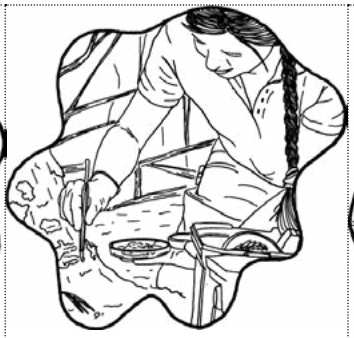
Giant Tasmanian Fresh-water Crayfish in creek

Each illustration represents one or more of the environmental, social and economic systems connected to Tasmanian forest environments.

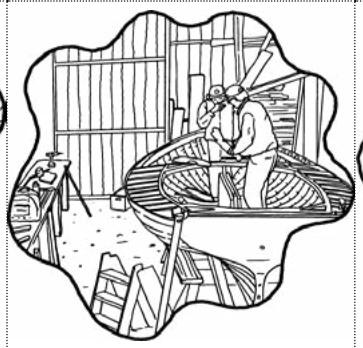
Inquiry Cubes



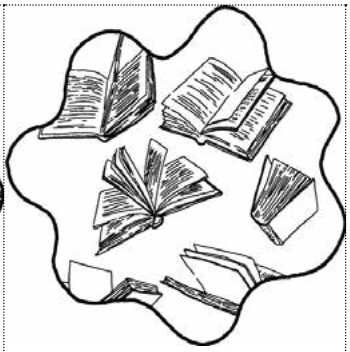
Stag beetle in leaf litter and soil



Scientist collecting moss samples

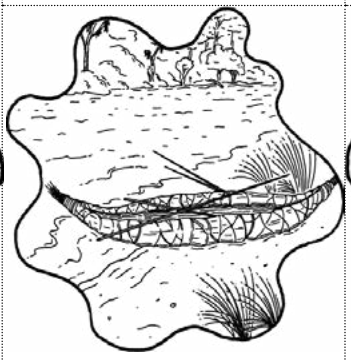


Boat being built at the Wooden Boat School

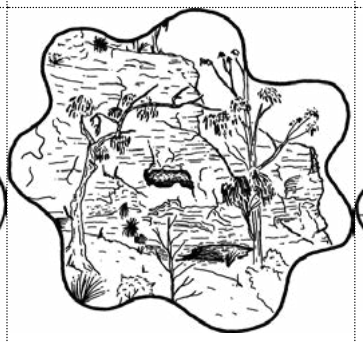


Books made of wood fibre

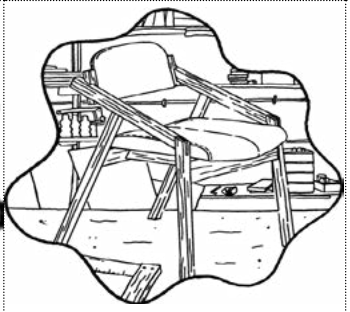
Person camping at Walls of Jerusalem National Park



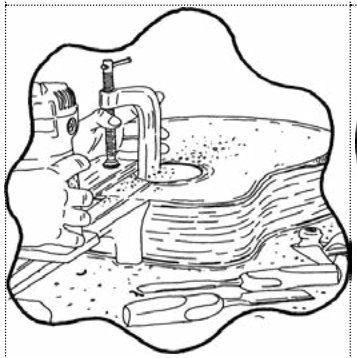
Aboriginal stringybark canoe on a riverbank



Rocky forest cliff face with rock shelters



'xo chair' made of Tasmania timber (Design Tasmania)



Guitar being crafted from specialty Tasmania timbers

Fungi growing on an old rotting log

Tasmanian tree frog beside a river

Firefighter using hose during forest fire

Forester using drone to collect data on plantation health

Suggested Activities

Content

11. Visuals of Setup/Pack-Up

12. Part A: Outside the Cubes

12. Part B: Inside the Cubes

13. Curriculum Integration

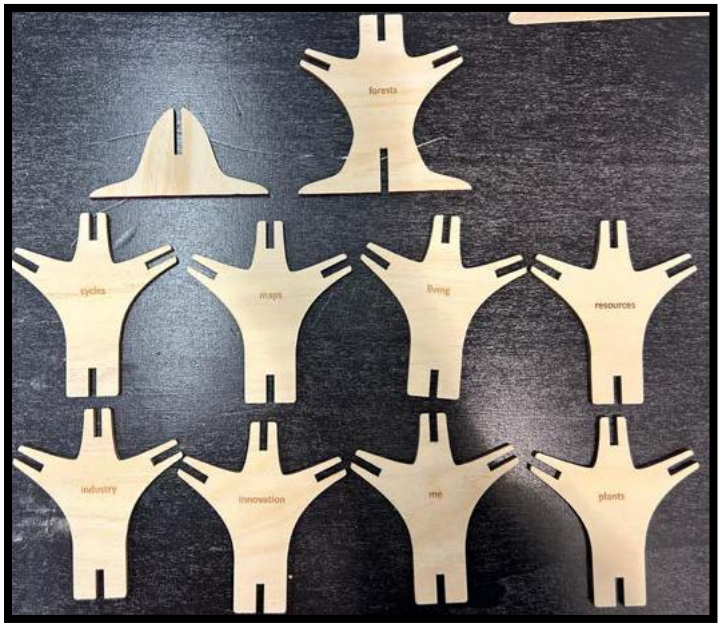
Visual of Setup/Pack-Up

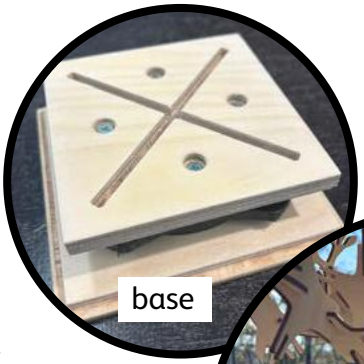
Inquiry Cubes

In the box: Cubes are kept in the foam-padded compartments in the carrier box. Extra tree pieces are kept in black bags in the open spaces.

In each cube:

- Two base pieces (first row of picture below).
- Eight trunk shaped pieces (shown in rows 2 and 3 of picture below).
- One tree base (underside of cube lid - pictured right).
- All other pieces go back into their black bags and live in the open sections of the carrier box.





Part A: Outside the Cubes

The *Inquiry Cubes* are designed as a provocation tool to begin your unit; to activate prior knowledge, promote discussion and facilitate collaborative meaning making.
What is the common connection between all these images?
**Please note: Students are not trying to guess what is inside the box.*

Materials: Set of *Inquiry Cubes* and five *Connect 5 templates (or alternative thinking routine, e.g., See, Think Wonder).*

Set Up:
Divide students into 5 groups and give each group a cube to share. Place the question mark facing down - What's inside will remain hidden during this activity.

Learning Sequence:

1. **Explain**
   Say: There is a mystery to be solved today, and your group will have to work together to find an answer.
2. **Explore the illustrations**
   Students begin by picking up and talking about the cube. As they notice that there is an opening, tell them they must not try to open it yet - You will give them a key after they solve the mystery! *Ask: What are the illustrations showing?*
3. **Connect to the Cube**
   After a few minutes, choose a cube and model thinking aloud. Describe what you see and how you connect to one of the illustrations *'I think this is a...' 'That reminds me of when I...'*
   Ask students to discuss the following prompts in their groups:
   - *What do you see?*
   - *What do you already know about what you see in the illustrations?*
   - *How do you connect to one or more of the illustrations?*
4. **Solve the Mystery**
   - After each group has shared some ideas and connections, explain that it is time to solve the mystery. *Ask: What word or phrase could connect all five images?* Model how to use the Connect 5 (or alternative thinking routine) to record your ideas before providing one to each group. Encourage each group to look for a pattern. The mystery is what connects the images - their answer in the center of the Connect 5.
     Note: Students are not trying to guess what is inside the box.
   - If students are struggling to describe an image, use the 'Behind the Illustrations' page for answers. For example, the Giant Tasmanian Freshwater Crayfish can be mistaken for a crab and correcting this can assist students in solving the mystery.
   - As groups report a solution to the puzzle, invite them to write or draw their solutions on a shared space (e.g., the whiteboard).
   - When all solutions are recorded, celebrate each idea. You can then reveal to the class the true key connecting theme: **Why forests are important**.

Part A: Outside the Cubes

Going Further:

- See the *Forest Thinking* activity on following page and use the *Forest Thinking Pieces* inside to explore vocabulary and prior knowledge.
- Read the *Forest Values* background information page to learn more about the values represented on the cubes. Revisit the cubes/Behind the Illustrations sheets and try sorting the images according to each value.
- Have students create their own *Inquiry Cubes* using the *Inquiry Cube Planner and Net*.
- Invite your students to become the Inquiry Cube experts! Have them lead students from another class through investigating the cubes.
- Spark a new inquiry! Develop your own as a class or choose one from those listed below.

Year	Inquiry Questions
3	*How are living and non-living things interconnected in forest landscapes?* Explore the living, non-living and once-living forest features represented on each cube. *How do plants and animals grow in forest environments?* Explore the names and life cycles of the plants and animals shown on each cube.
4	*How are trees important to people, animals and the environments they are in?* Explore what role trees are playing in images across the cubes (e.g., habitat, timber, shade...) *What resources do forests provide and how can we use them sustainably for the future?* Explore resources which come from forests across the images on the cubes, past and present. *How do producers, consumers and decomposers interact in healthy forest ecosystems?* Explore the producers, consumers and decomposers represented in images across the cubes.
5	*How have people influenced the characteristics of forest landscapes in Tasmania, past and present?* Explore the images with a focus on the human activities and potential impacts. *How can we manage Tasmanian forest environments for the future?* Explore the environmental, social and economic values represented across all images on the cubes. Learn about the history of bushfires in Tasmania and consider the impacts these have on our environmental, social and economic systems. Investigate how fire has been and is used in forest management.
6	*How do physical conditions of a habitat influence what thrives there?* Explore the elements of habitat represented in the images across the cubes. Identify the plants and animals shown and investigate the physical conditions of the forest types they thrive in (e.g., dry eucalypt forests, wet eucalypt forests or temperate rainforests). *How will/is climate change impacting the growth and survival of Tasmanian plants and animals?* Explore the elements of habitat and forest types represented across the images on the cubes. Investigate how changing physical conditions (e.g., increased temperature, reduced rain, increasing severity of storm events) could impact the growth and survival of a specific species.

Part B: Inside the Cubes

Inquiry Cubes

The *Forest Thinking Pieces* inside the cubes are a great way to assess the prior knowledge of your students and begin to build connections. The pieces may provide provocation for thought or guided discussion, be introduced across the span of your unit, or used as part of a vocabulary wall. The thoughts and ideas revealed around these key words can support your teaching plan by exposing the interests, misconceptions and gaps in knowledge of your students.

These trees can be revisited throughout the unit as students build their forest vocabulary, adding words or changing connections as their understanding grows.

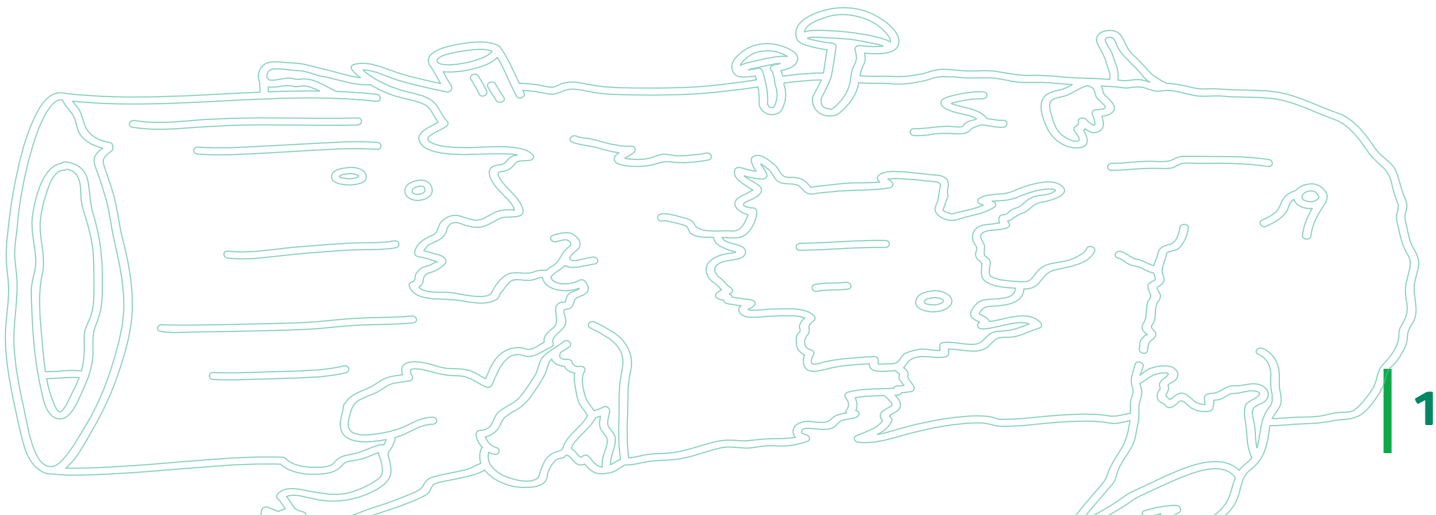
Materials: *Inquiry Cubes*, rulers, spare *Forest Thinking Pieces*

Learning Sequence:

1. Show students how to use a ruler or trunk *Forest Thinking Piece* to gently twist the black keyhole on the question mark face.
2. Empty the pieces out and begin by building the base of the tree. Students then read the key words and consider which connect to each other and why.
3. Once the trunk has been built, provide each group with a black bag full of extra pieces. They can use these to complete their tree.

Going Further:

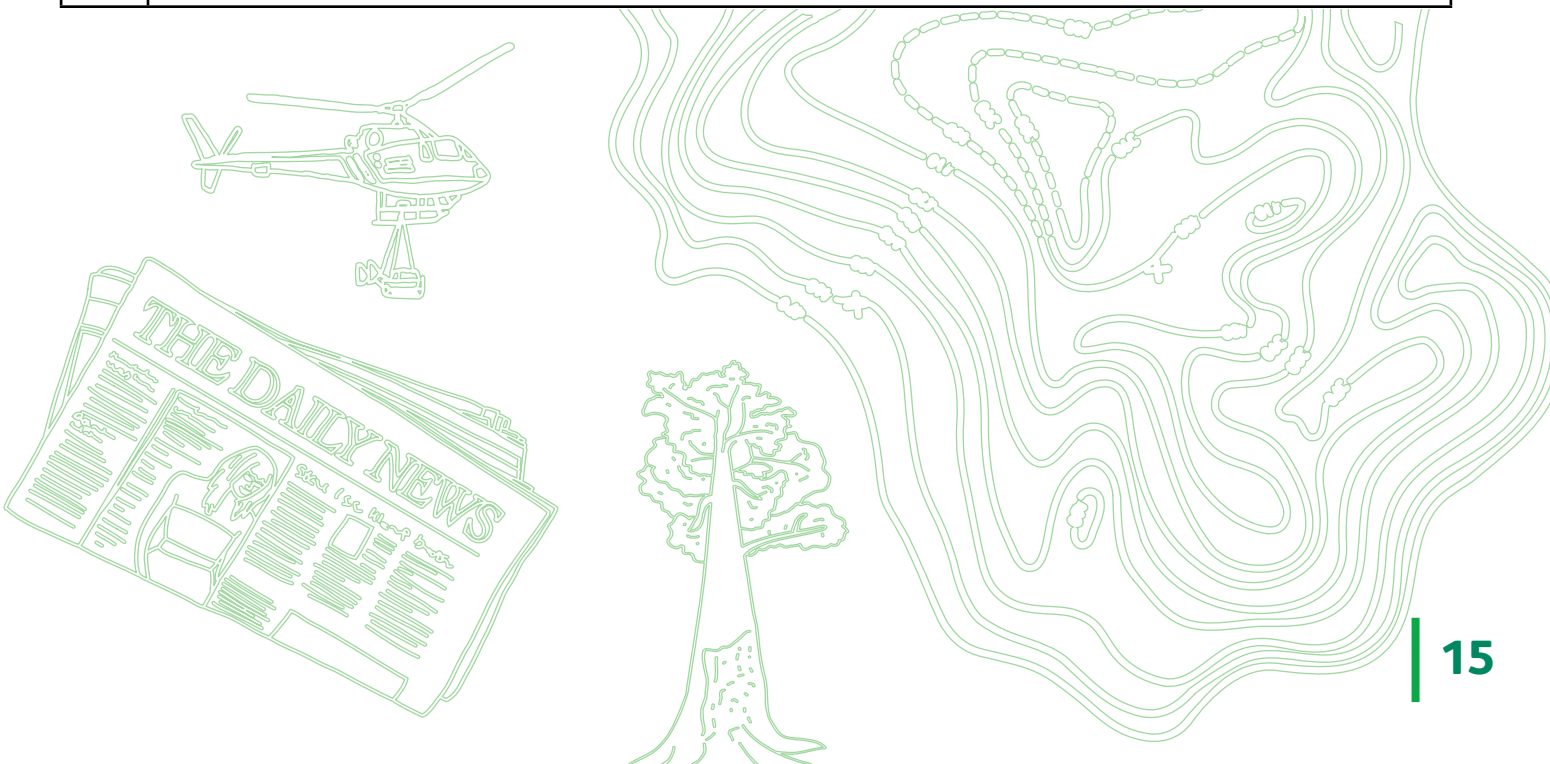
- *Ask students:* What is a forest? Draw, write or digitally record students' initial understandings.
- Create a digital brainstorm of student-generated words relating to forests/your inquiry focus (e.g., wordcloudfree.com)
- Sort student generated words or pictures into categories. You might see patterns start to develop that you can explore.
- Give each stuent a focus word from the pieces and have them research the meaning of this word and its connection to forests/your unit of learning.
- Have students describe their personal connections to forests.
- *Ask students:* Do you have anything you are curious or wondering about forests?



Curriculum Integration

Inquiry Cubes

The images on the *Inquiry Cubes* and the values they represent can inspire lessons across many curriculum areas.	
English	Many text types can be explored by focussing on one or more of the images. **Narrative writing** - Use the images on your cube to inspire a narrative. **Persuasive writing** - Choose an image and pose a question related to it. For example, should pathways be built in forests? **Information report** - Choose an image and write an information report related to it (e.g., the wedge-tailed eagle, Aboriginal connection to forests in Tasmania, the history of wooden boats). **Instructions** - Choose an image to write instructions for (e.g., how to build a treehouse, how to find a frog, how to fly a drone).
Mathematics	There are numerous opportunities to use forests as an authentic context for learning across the Mathematics strands. **Number** - Use the images to create and solve addition, subtraction, multiplication and division problems. **Measurement** - Explore the metric units involved in forest management (e.g., area of a site, number of species counted in an area, mass of timber harvested, duration spent monitoring wedge-tailed eagle nests, speed of swift parrots, diameter of habitat trees). **Space** - Analyse, interpret and create maps representing forest landscapes with consideration of the multiple values it may hold (e.g., farm, local reserve, national park). **Statistics** - Create and investigate questions of interest related to forests and their environmental, social and economic systems (e.g., survey community members to determine uses of forests for recreation). Collect, record, represent and display findings appropriate to year level.



Inquiry Cubes

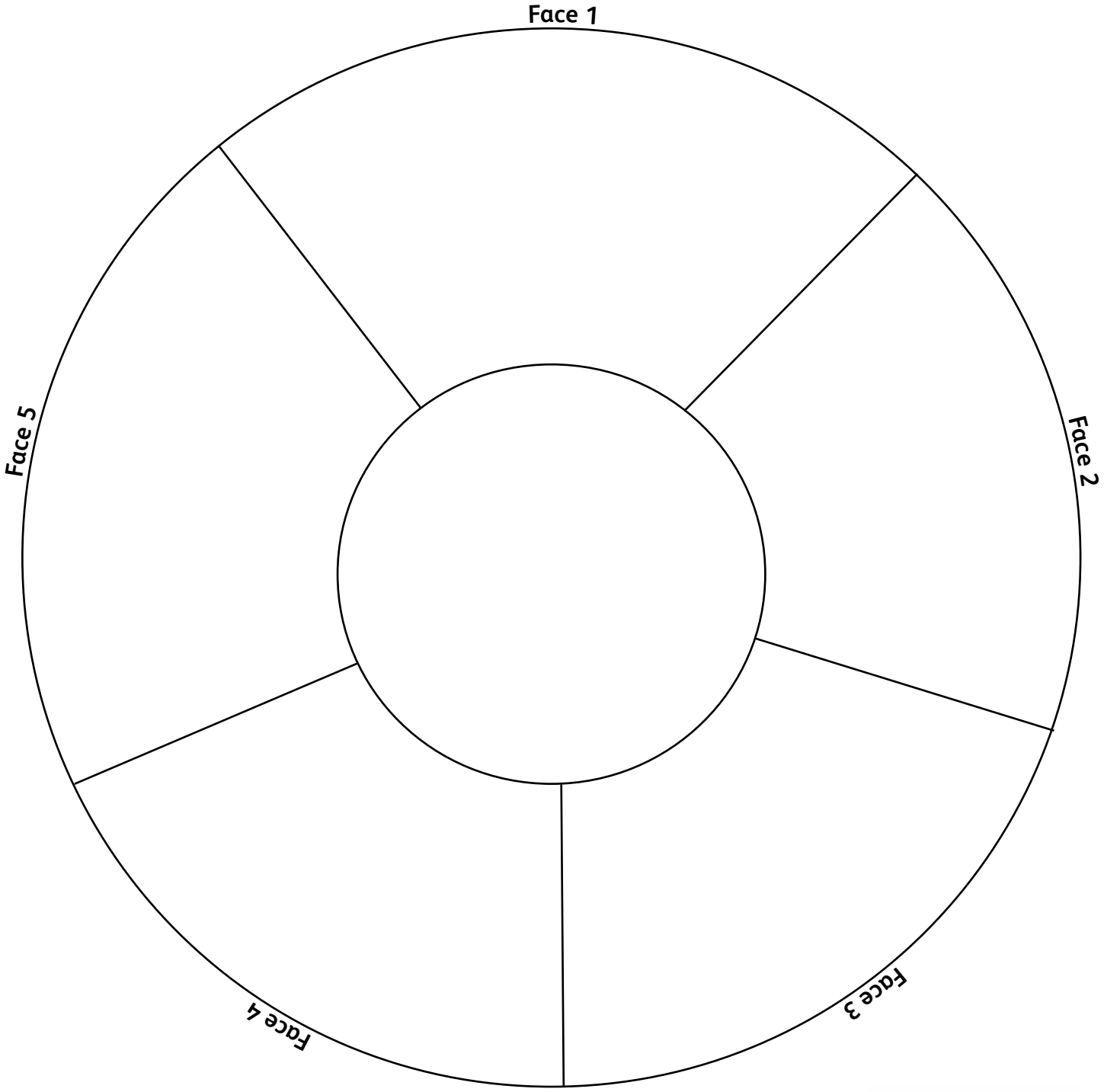
Support Materials

Content

- Connect 5
- See, Think, Wonder
- See, Think, Me, We
- Claim, Support, Question
- Inquiry Cube Planner
- Forest Inquiry Cube Net

Connect 5

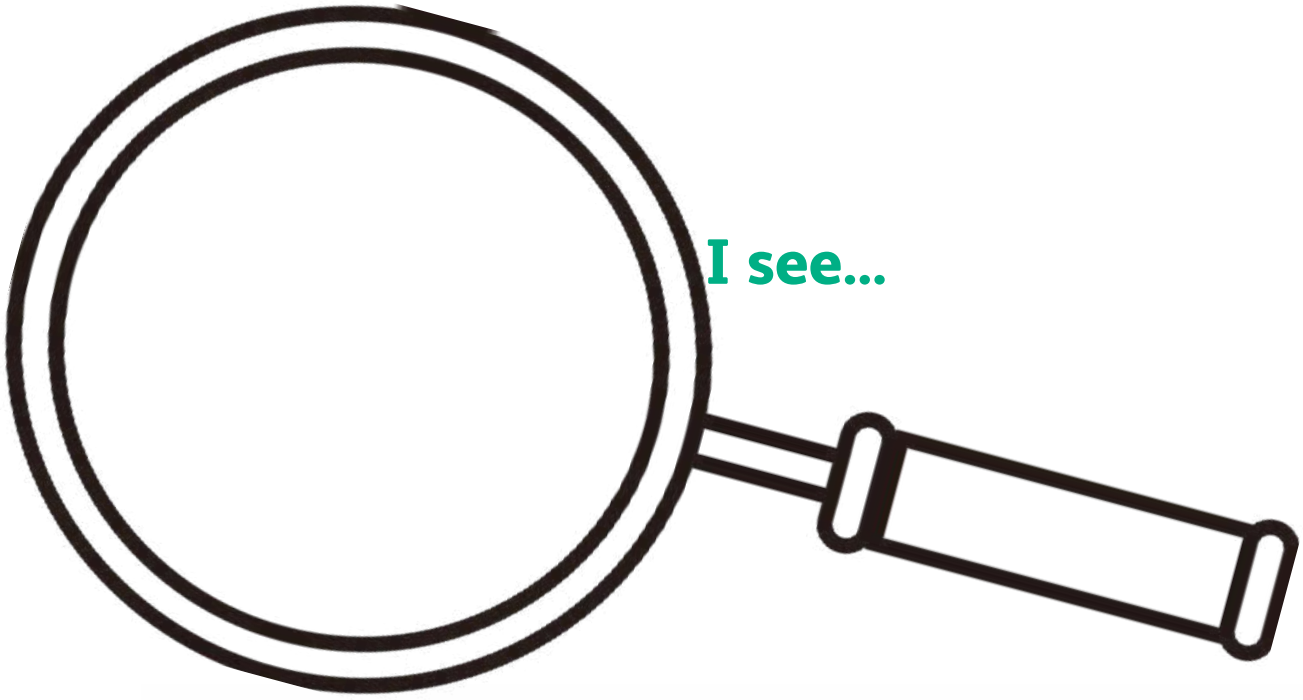
As a team, <u>describe</u> what you see on each face of the cube (1 through 5).
What theme, word or idea could connect all five faces? Look for a pattern.
Write and/or draw your answer in the center circle.
Write any questions or wonderings your group have in the box at the bottom of the page.



What we wonder...

Forest Education Foundation
The stories behind our trees

See, Think, Wonder



I see...

I think...

I wonder...

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The stories behind our trees

See, Think, Me, We

See - Record what you see around the cube.	**Think** - What one thing do you think all the illustrations connect to? What's the theme?
Me - How do you connect to one or more of the illustrations?	**We** - How does your community connect to one or more of the illustrations?

https://pz.harvard.edu/thinking-routines

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Claim, Support, Question

Claim (the inference) What are the illustrations about?	**Support (the evidence)** What makes you think this?

Question (the wonder)

What questions do you have? What could you ask to explore further?

https://pz.harvard.edu/thinking-routines

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The stories behind our trees

Inquiry Cube Planner

What is the theme of your cube?
Example themes may be: managing Australian environments, animal adaptations, tree life cycle...

Face 1

Face 2

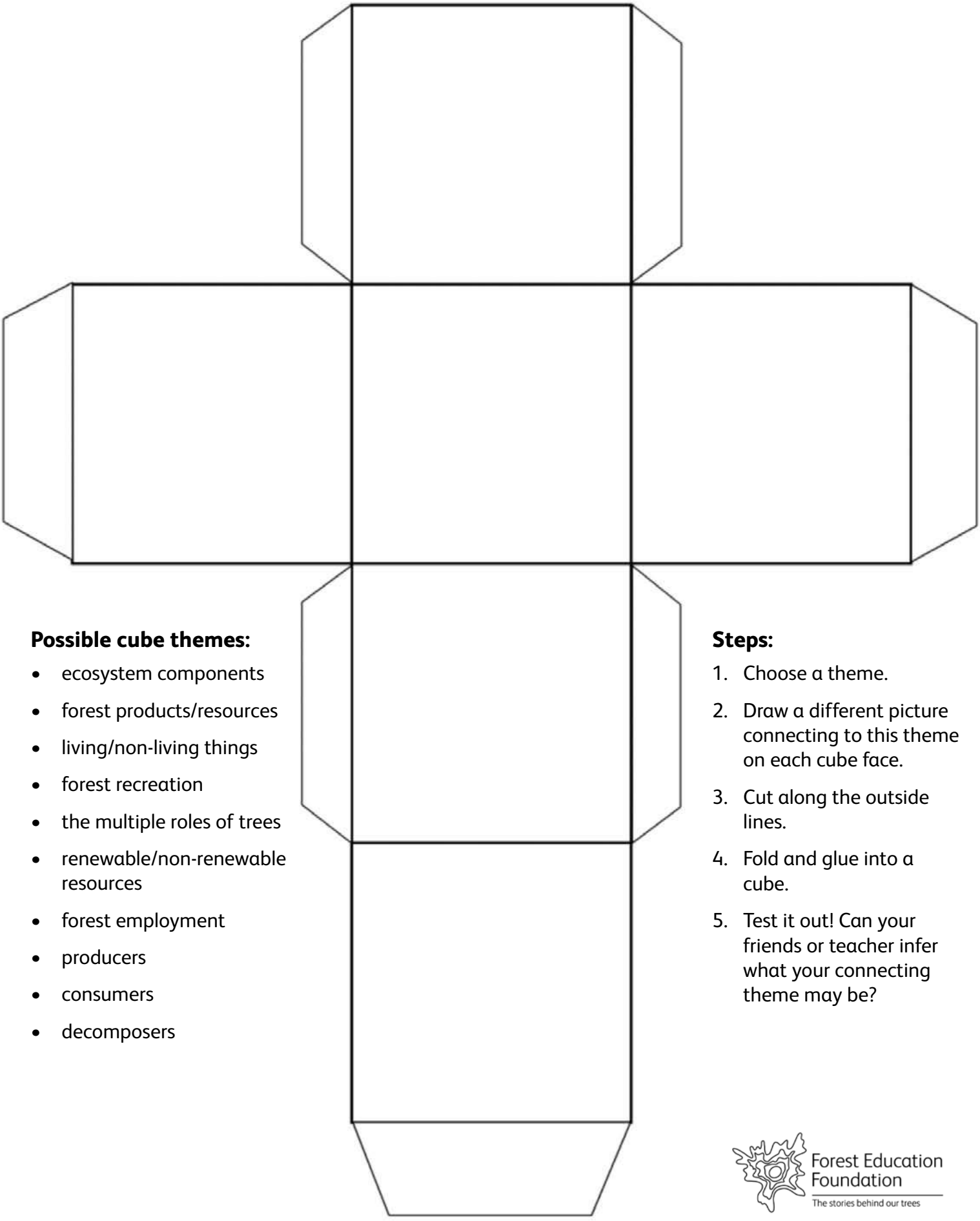
Face 3

Face 4

Face 5

How do your images connect to your theme?

Inquiry Cube Net



Possible cube themes:

- ecosystem components
- forest products/resources
- living/non-living things
- forest recreation
- the multiple roles of trees
- renewable/non-renewable resources
- forest employment
- producers
- consumers
- decomposers

Steps:

1. Choose a theme.
2. Draw a different picture connecting to this theme on each cube face.
3. Cut along the outside lines.
4. Fold and glue into a cube.
5. Test it out! Can your friends or teacher infer what your connecting theme may be?

Forest Education Foundation
The stories behind our trees

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About The FEF

The Forest Education Foundation Inc. (FEF) is a not-for-profit educational institution staffed by qualified and experienced teachers. The Foundation has been providing learning experiences for teachers and students throughout Tasmania for over 25 years (Prep–12 and beyond).

For more information on all our programs, visit our website:

www.forest-education.com