

**Stage 4**  
**Geography**  
**Week 9**



# What is weather?

Our Earth is surrounded by a band of gases called the atmosphere. It protects our planet from the extremes of the sun's heat and the chill of space, making conditions just right for supporting life. The atmosphere has five different layers. The layer that starts at ground level and ends about 16 kilometres above Earth is called the troposphere. Our weather is the result of constant changes to the air in the troposphere. These changes sometimes cause extreme weather events.

Droughts, floods, cyclones, tornadoes, heatwaves and snowfalls — even cloudless days with gentle breezes — all begin with changes to the air in the troposphere. The five main layers in the Earth's atmosphere all differ from one another. For example, the troposphere contains most of the **water vapour** in the atmosphere. As a result, this layer has an important link to **precipitation**.

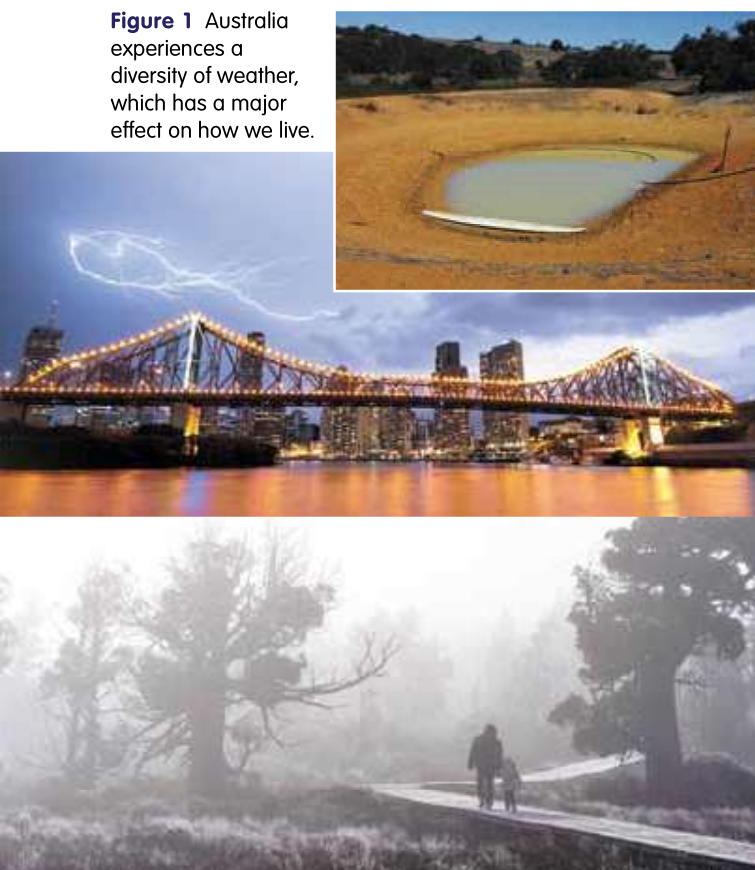
## How does weather change?

All weather conditions result from different combinations of three factors:

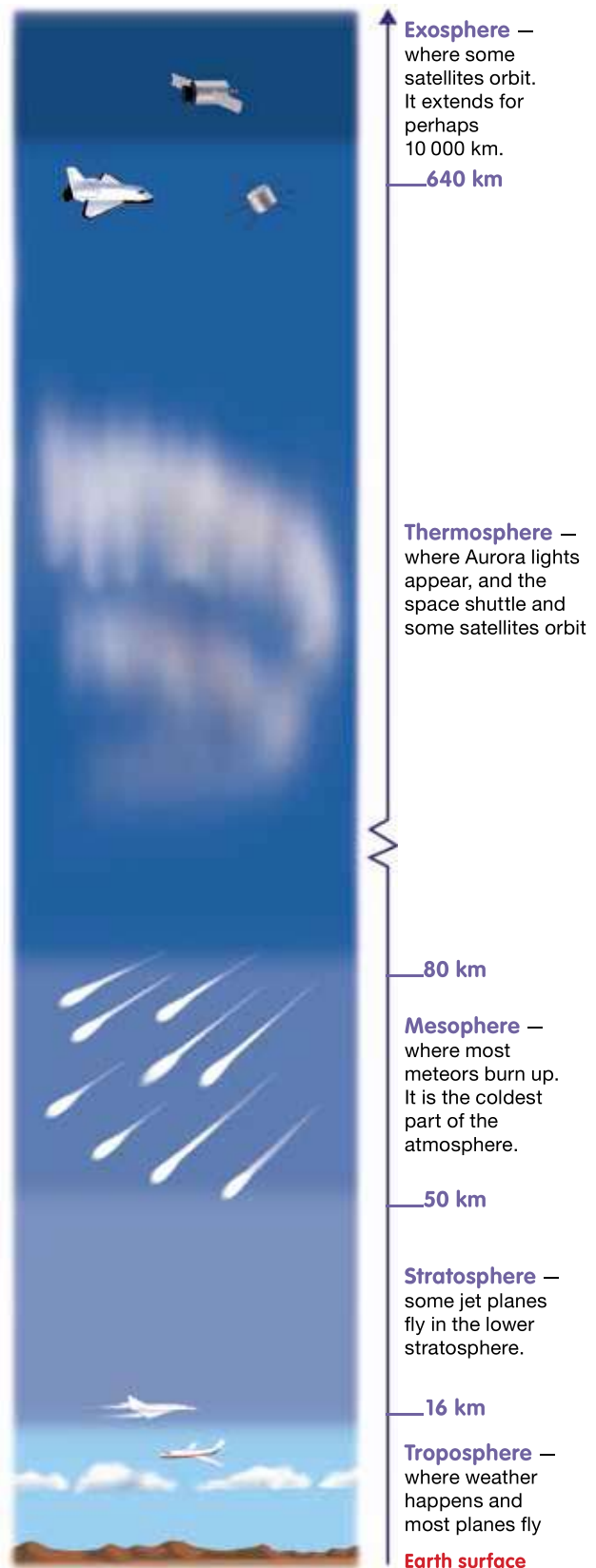
- air temperature
- air movement
- the amount of water in the air.

The sun influences all three.

**Figure 1** Australia experiences a diversity of weather, which has a major effect on how we live.



**Figure 2** Structure of the Earth's atmosphere (not to scale)





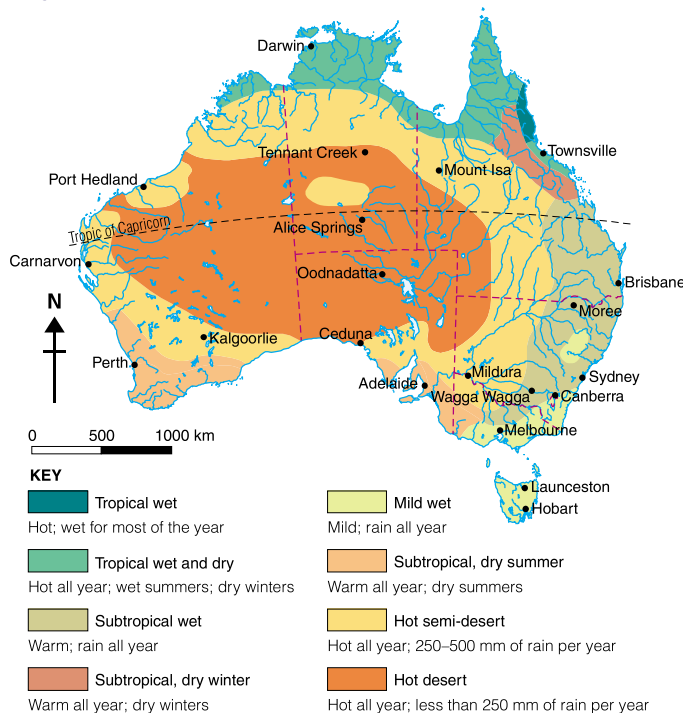
First, the sun heats the air. It also heats the Earth's surface, which in turn heats the air even more. How hot the Earth's surface becomes depends on the season and the amount of cloud cover.

Second, the sun causes air to move. This is because the sun heats land surfaces more than it heats the oceans. As the warm air over land gets even warmer, it expands and rises. When hot air rises, colder air moves in to take its place.

Third, the sun creates moisture in the air. The heat of the sun causes water on the Earth's surface to **evaporate**, forming water vapour. As this water vapour cools, it condenses, forming clouds. It may return to Earth as rain, dew, fog, snow or hail.

At times these three factors — temperature, air movement and water vapour — can create extreme weather events. Very high air temperatures influence heatwaves; rapidly rising air plays a part in the formation of cyclones; and excess rain can create flooding.

**Figure 3** Climatic zones of Australia



## Weather and climate: what is the difference?

Weather is the day-to-day, short-term change in the atmosphere at a particular location. Extreme weather events are often described as unexpected, rare or not fitting the usual pattern experienced at a location.

Climate is the average of weather conditions that are measured over a long time. Places that share the same type of weather are said to lie in the same climatic zone. Because of the size of the Australian continent, its climate varies considerably from one region to another.

**evaporate** to change liquid, such as water, into a vapour (gas) through heat

**precipitation** the form of water falling from the sky, such as rain, snow or hail

**water vapour** water in its gaseous form, formed as a result of evaporation

## **What is Weather?**

1. What is the name of the layer of the atmosphere where all Earth's weather happens?

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2. Define the term *troposphere*.

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3. In which levels of the atmosphere are the following features found?

- a. Most passenger planes

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- b. Orbiting satellites

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- c. Burning meteors

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- d. The Aurora lights

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4. Explain the difference between weather and climate.

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5. Look carefully at the map of Australia's climatic zones in figure 3. Predict which two settlements, or *places*, might be at risk of flood. Make sure you explain why you chose them.

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6. Look at the *environment* outside your window. What is the weather like? Do you think it matches the climatic zone in which you live?

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# How is a natural hazard different from a natural disaster?

Australia is prone to a wide variety of **natural hazards**, which range from drought and bushfire to flooding. Many of these events are part of the weather's natural cycle. However, human actions such as overgrazing, deforestation and the alteration of natural waterways have sometimes increased the impact of these hazards. So why do people continue to live in areas that are at risk of experiencing these hazards?

## Australia's worst natural disasters

- *Flood*, Queensland, New South Wales and Victoria 2010–2011: 35 deaths, 20 000 homes destroyed in Brisbane alone, \$5.6 billion cost
- *Bushfire*, Black Saturday, Victoria 2009: 173 deaths, 3500 buildings destroyed, \$1.5 billion cost
- *Cyclone*, Cyclone Tracy, Darwin 1974: 65 deaths, 10 800 buildings destroyed, \$4180 million cost
- *Hailstorm*, Sydney 1999: 1 death, 24 800 buildings damaged, \$2000 million cost
- *Earthquake*, Newcastle 1989: 13 deaths, 50 000 buildings damaged, more than \$4000 million cost

## Top five worst natural disasters worldwide in the last decade

- *Tsunami*, Indian Ocean 2004: approximately 230 000 deaths
- *Cyclone*, Cyclone Nargis, Myanmar, 2008: at least 146 000 deaths
- *Earthquake*, Sichuan, China, 2008: approximately 87 400 deaths
- *Earthquake*, Kashmir, Pakistan, 2005: approximately 79 000 deaths
- *Tsunami*, Japan, 2011: approximately 19 300 deaths

There is a difference between natural hazards and **natural disasters**. A hazard is an event that is a *potential* source of harm to a community. A disaster occurs as the result of a hazardous event that dramatically affects a community. There are four broad types of natural hazard:

1. atmospheric — for example, cyclones, hailstorms, blizzards and bushfires
2. hydrological — for example, flooding, wave action and glaciers

3. geological — for example, earthquakes and volcanoes
4. biological — for example, disease epidemics and plagues.

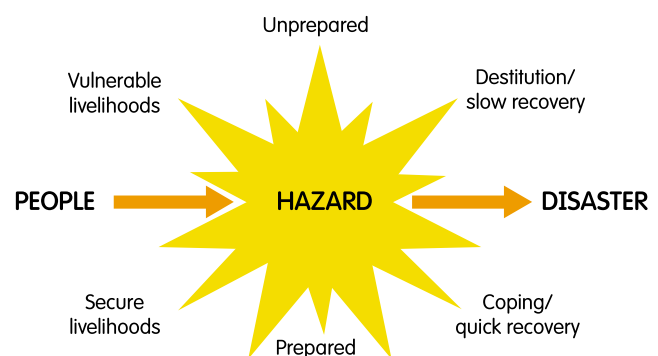
Clearly natural hazards that are linked to the weather are categorised into the atmospheric and hydrological types. Hazards such as flooding and cyclones could also be termed extreme weather events.

Some natural hazards are influenced by the actions of people and where they choose to locate themselves. For example, the severity of a flood depends not only on the amount and duration of rainfall that occurs. Humans can influence floods by building on floodplains and not planning well for disaster. Environmental degradation and poor urban planning can also turn natural hazards into natural disasters.

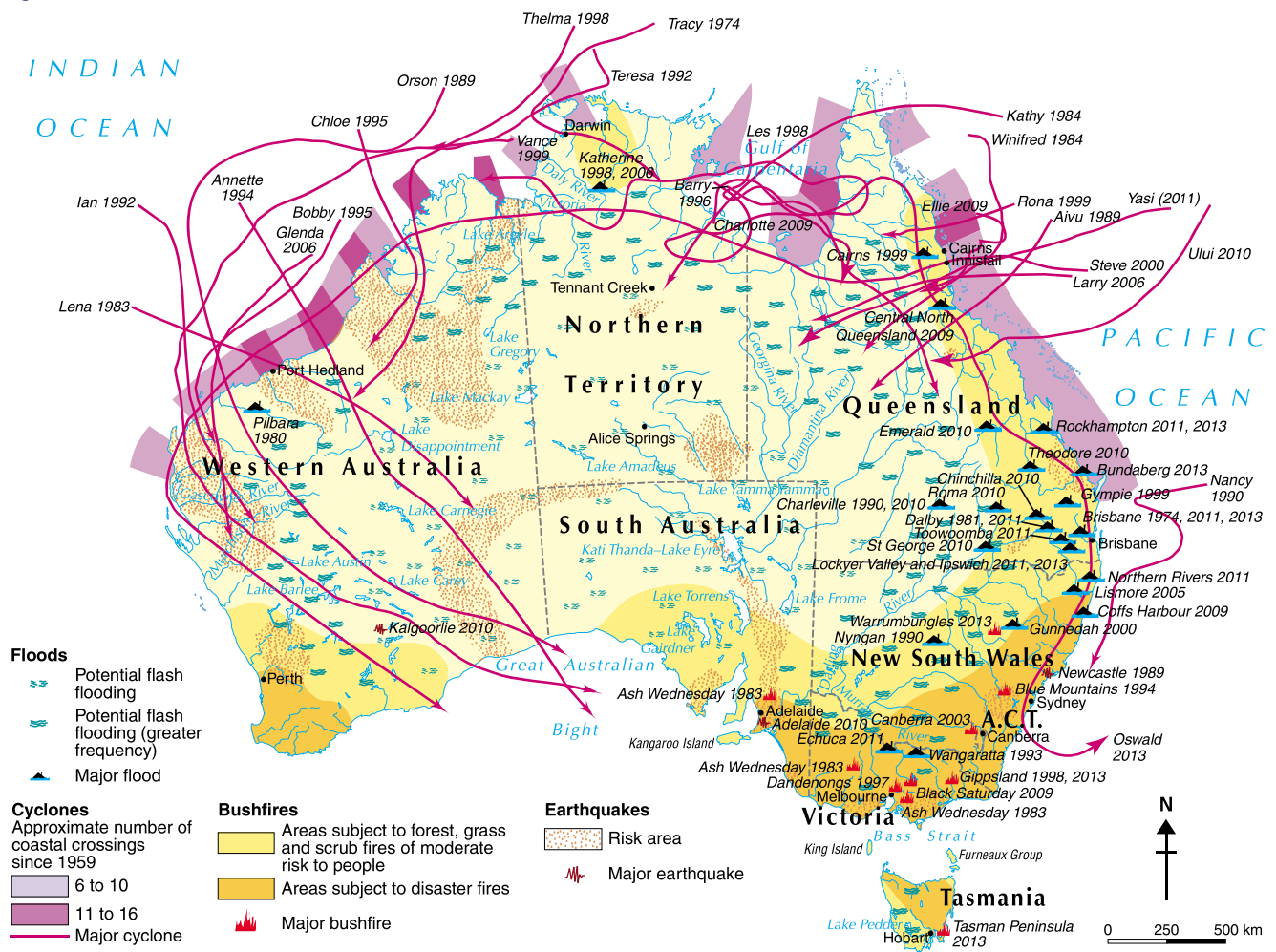
## Why do people live in areas at risk from natural hazards?

Risk is the possibility of negative effects caused by a natural hazard. Therefore, the type of hazard experienced, along with the **vulnerability** of the people affected, will determine the risk faced. The poorest people in the world are vulnerable because their ability to recover from the impact of a hazard is hampered by their lack of resources. In an event such as a flood or earthquake, people lose their personal belongings, homes and livestock, which are often linked to their incomes, continuing the cycle of poverty. However, in regions that are adequately prepared, and where there is support to cope and rebuild, people recover more quickly.

**Figure 1** The link between vulnerability and disaster



**Figure 2** Australia's natural hazards and disasters



**natural disaster** an extreme event that is the result of natural processes and causes serious material damage or loss of life

**natural hazard** an extreme event that is the result of natural processes and has the potential to cause serious material damage and loss of life

**vulnerability** the state of being without protection and open to harm

## **How is a Natural Hazard different from a Natural Disaster?**

7. How do natural hazards and natural disasters differ?

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8. Explain how a flood is both a natural and human hazard.

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9. Explain why the risk of experiencing a natural disaster depends on the geographical location of a community.

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10. Describe key *changes* that natural hazards and natural disasters can cause to an *environment*.

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11. Refer to figure 2.

a. What types of natural disasters occur most often in Australia?

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b. Describe the location of Australia's cyclone hazard zone.

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c. Give one example of a community that has suffered a bushfire disaster.

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d. What type of hazards are communities around Newcastle subject to?

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e. What would be the likely impact of a large earthquake occurring in the earthquake risk area in the Northern Territory?

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# Sustainability

## Across

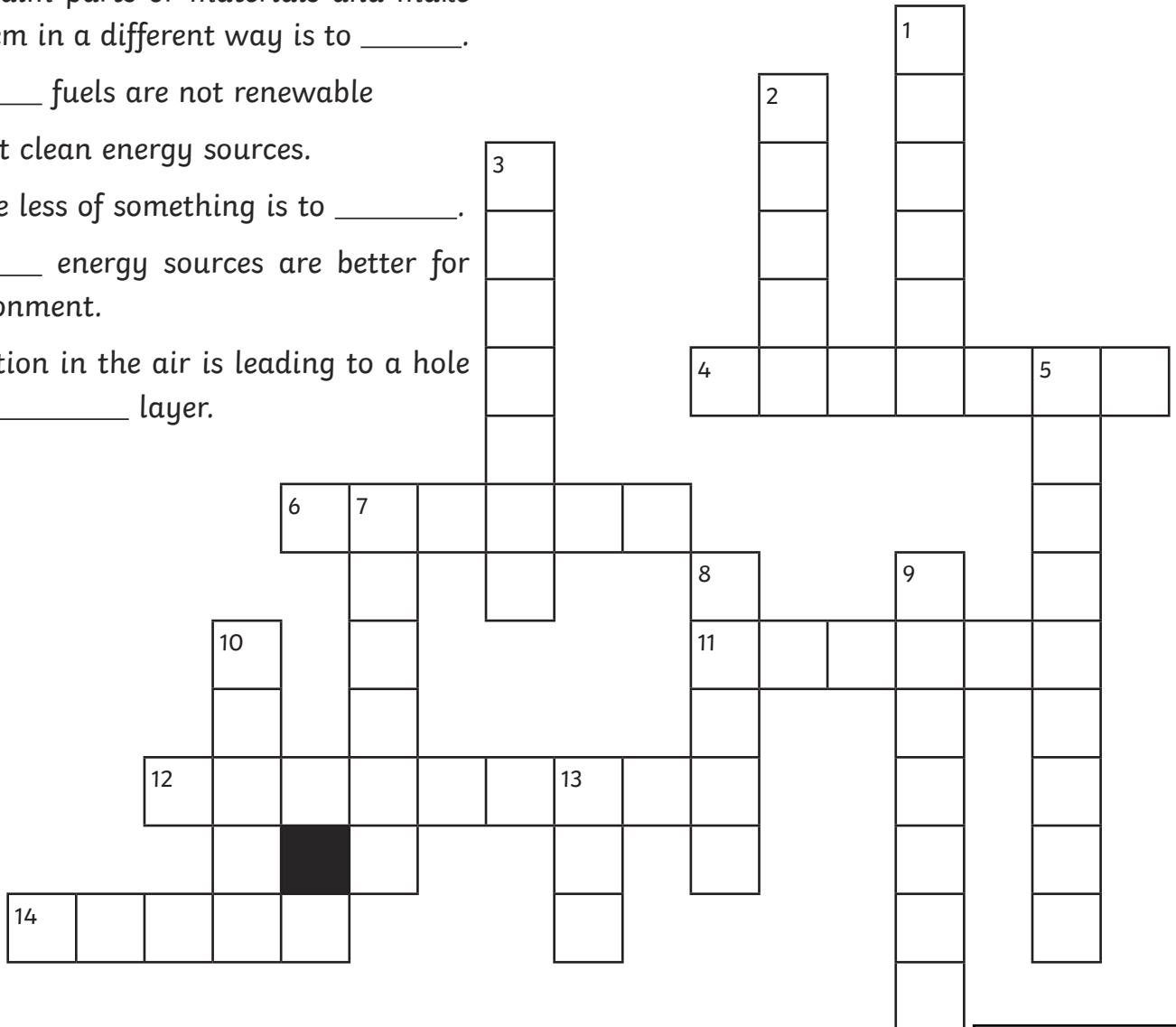
4. To reclaim parts or materials and make use of them in a different way is to \_\_\_\_\_.

6. \_\_\_\_\_ fuels are not renewable and aren't clean energy sources.

11. To use less of something is to \_\_\_\_\_.

12. \_\_\_\_\_ energy sources are better for the environment.

14. Pollution in the air is leading to a hole in the \_\_\_\_\_ layer.



## Down

1. It's important to reduce our \_\_\_\_\_ usage.

2. To use something again is to \_\_\_\_\_.

3. Food scraps can be put in the \_\_\_\_\_.

5. When you throw rubbish on the ground, you are \_\_\_\_\_.

7. Humans need \_\_\_\_\_ to breathe.

8. Planting \_\_\_\_\_ helps to make more clean air for us to breathe.

9. Another word for litter is \_\_\_\_\_.

10. Rubbish on the street can end up on the \_\_\_\_\_.

13. It's important to always throw your rubbish in the \_\_\_\_\_.

Renewable  
Ozone  
Ocean  
Bin  
Trees  
Fossil  
Recycle  
Littering  
Oxygen  
Reuse  
Rubbish  
Energy  
Reduce  
Compost



# Sustainability

n p e n e r g y e r t e  
c o n s e r v e s e e l  
a l n d e w t h u s c e  
v l c r b s g e s o h c  
l u o e e t y k t u n t  
a t m n a n r g a r o r  
d i k e r f e t i c l i  
w o l w t n c w n e o c  
g n o a h a y u a s g i  
y e g b a y c p b b y t  
u s d l w i l d l r l y  
j q d e b d e r e u s e

sustainable

reuse

pollution

renewable

electricity

resources

energy

technology

nonrenewable

Earth

conserve

recycle