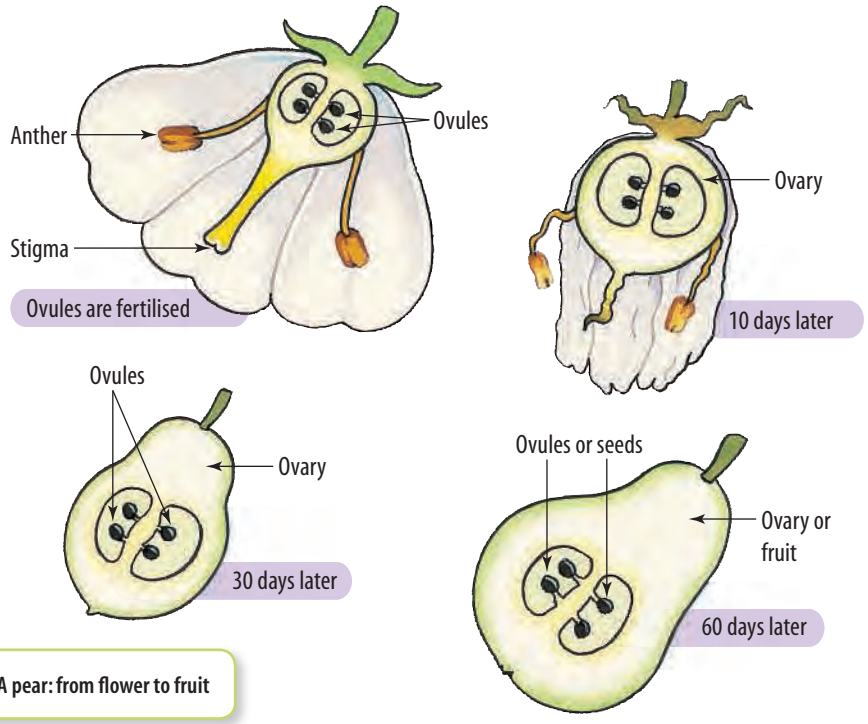
Plant tales

Are you aware that when you bite into an apple, cherry or orange you are actually eating the enlarged ovary of the plant? Did you know that these swollen ovaries contain the plant's 'babies' in their embryonic form? The plants are using you as a way of distributing their 'young' out into the world.

Eggs, embryos, seeds and fruit

Once the flower has done its job and the egg cell has been fertilised by the **pollen** nucleus, another sequence of events takes place. The fertilised egg, in the middle of the **ovule**, divides into a little ball of cells that becomes an **embryo**. Special tissue called **endosperm** surrounds the embryo and supplies it with food.



A pear: from flower to fruit

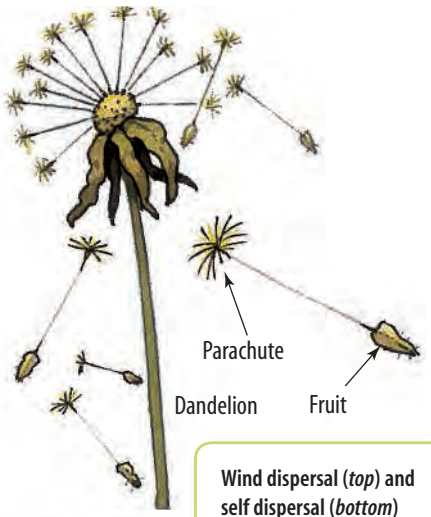
The ovule becomes the **seed** and tissue forms around it to provide a protective **seed coat**. During the formation of the seed, the ovary expands and turns into a **fruit**.

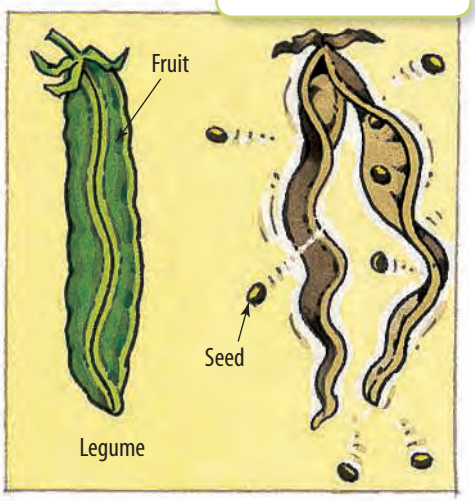
Seed dispersal

One of the main jobs that fruits do is to help disperse or spread the seeds. There is a variety of ways in which plants disperse their seeds: dispersal may involve animals, including birds (such as in tomatoes, grapes and apples); water (such as in coconuts); or wind (such as in grasses and dandelions). Some plants can disperse their seeds by themselves. For example, the fruits of some plants in the pea family (legumes) split open suddenly when they are ripe and dry, throwing the seeds out for long distances.

HOW ABOUT THAT!

Fruits that attract animals are usually brightly coloured. When a fruit is eaten by an animal, only the soft parts of the fruit are digested. The seeds are not broken down inside the animal and are passed out in its faeces.

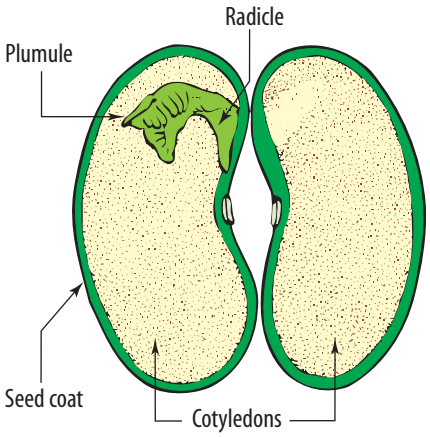




Wind dispersal (*top*) and self dispersal (*bottom*)

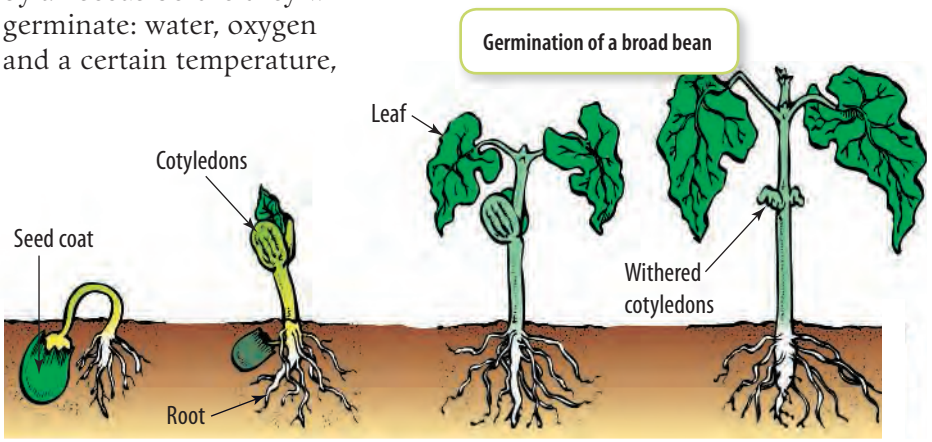
Seeds and germination

The embryo, inside the seed, is made up of three different parts: the baby shoot (**plumule**), the baby root (**radicle**) and one or two thick, wing-like **cotyledons**.



When the conditions are right, the seed bursts open and a new plant grows out. This process is called **germination**. When germination is complete, the embryo has become a young plant or **seedling**.

There are three environmental conditions that are needed by all seeds before they will germinate: water, oxygen and a certain temperature, usually warm. Water is necessary for the seed to swell and burst open and then to transport food to the growing embryo. Oxygen is required to help provide the energy needed for growth and development. The temperature varies with the particular type of plant.



INQUIRY: INVESTIGATION 4.8

Sunflowers and maize seeds — watch them grow

KEY INQUIRY SKILLS:

- conducting
- processing and analysing data and information

Equipment:

2 maize seeds and 2 sunflower seeds (all soaked for at least 24 hours)

transparent glass jar with a lid

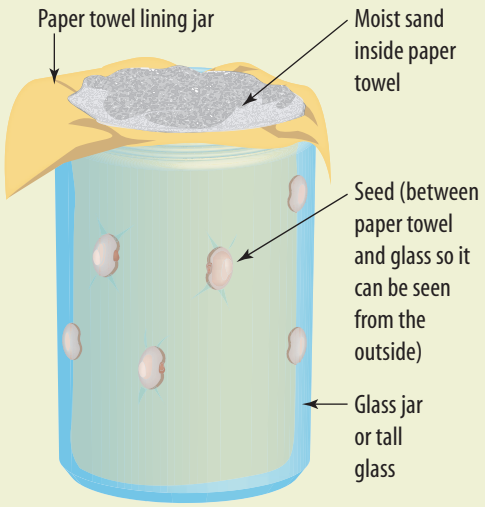
blotting or absorbent paper

hand lens or stereo microscope

- Closely examine the soaked seeds.
- Place some absorbent paper around the inside of the clean, dry glass jar.
- Carefully push the four seeds down between the paper and the jar (each about one-quarter of the way around).
- Pour water into the jar to a depth of about 3 cm.
- Make some holes in the lid, then screw it onto the jar.
- Carefully observe the seeds each day.

DISCUSS AND EXPLAIN

1 Sketch each seed, recording as many observations as you can.



2 Make detailed drawings of each seed and describe its development.

3 Record observable shoot and root measurements each day in a table.

4 Did the two different types of seed grow the same way? Describe the similarities and differences.

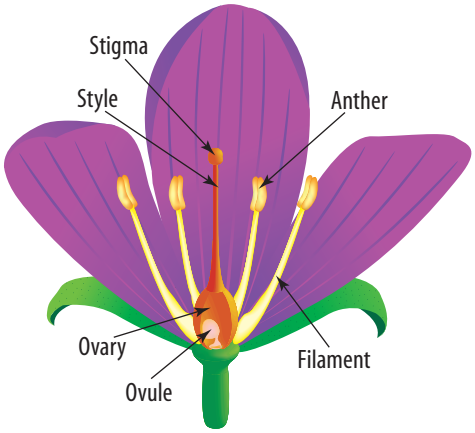
5 Summarise your measurements in a graph.

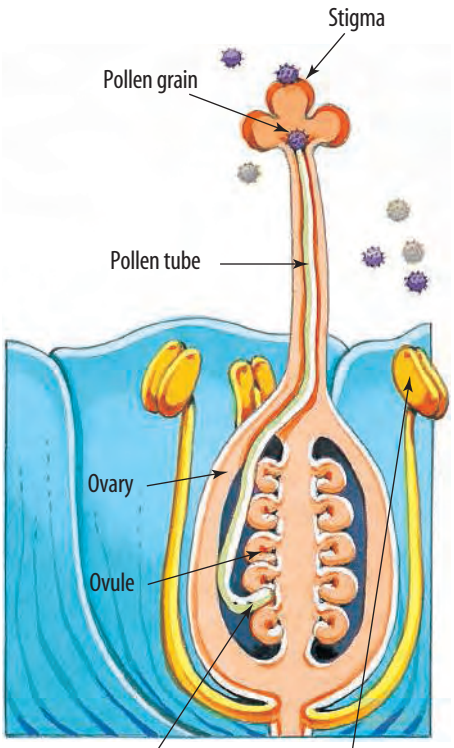
6 Did you obtain the results that you expected? Explain.

7 Write a conclusion on the basis of your findings.

Some Australian plants, such as *Banksia* and mountain ash (*Eucalyptus regnans*), require high temperatures to burst the fruit so that the seeds may be released. This adaptation gives these plants an excellent chance of survival in regions prone to bushfires.

Although light is not necessary for the germination of most seeds, it is needed once the young shoot breaks through the soil surface so that the plant can make its own food.

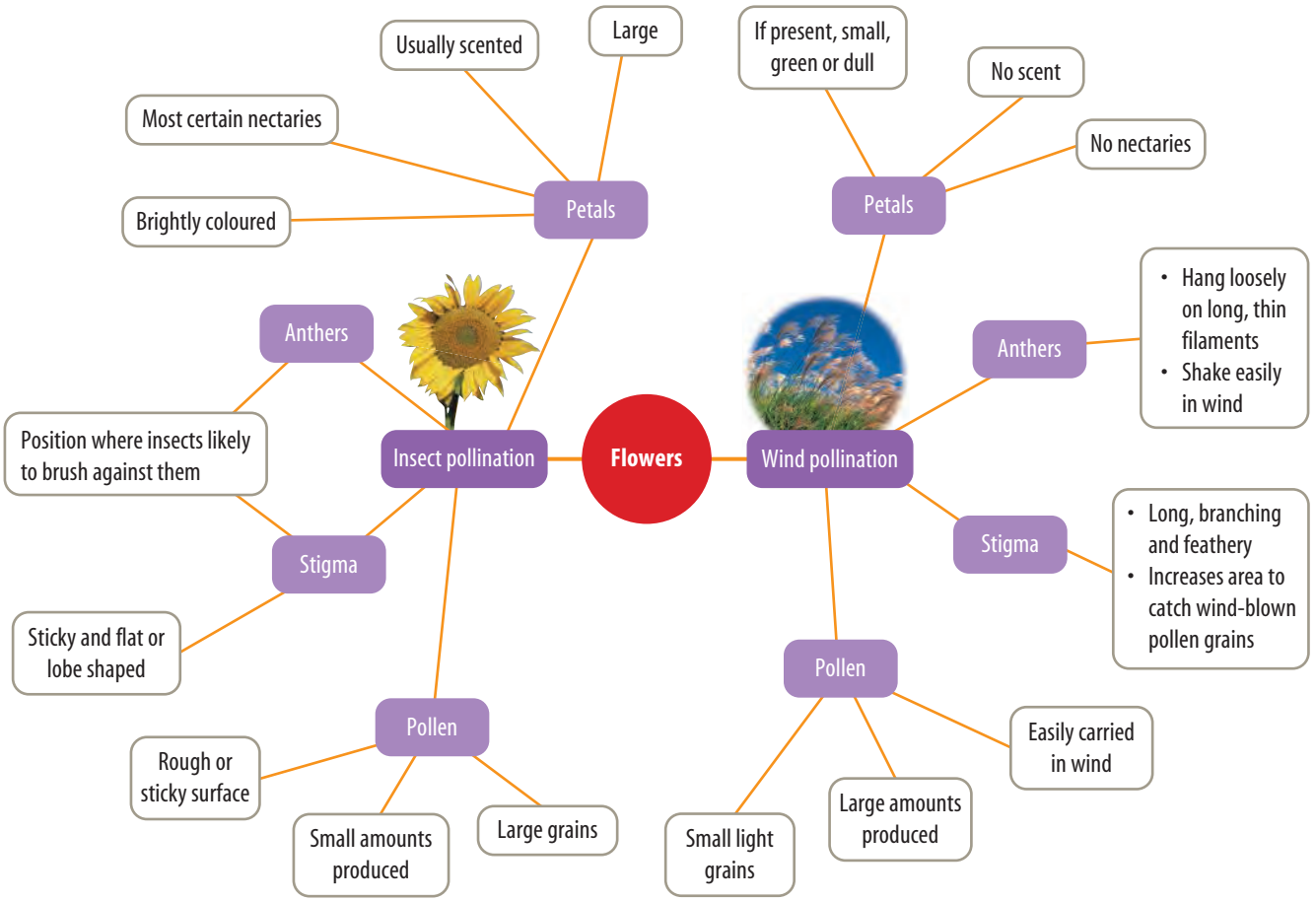




Pollination pathways

Like animals, many plants can reproduce sexually. Flowering plants have their reproductive structures located in their flowers.

Pollination occurs when pollen grains reach the **stigma**. Plants may pollinate themselves (self-pollination) or they may obtain pollen from a flower of another plant of the same species (cross-pollination). Cross-pollination increases the variation among the offspring and gives the species a better chance of survival.



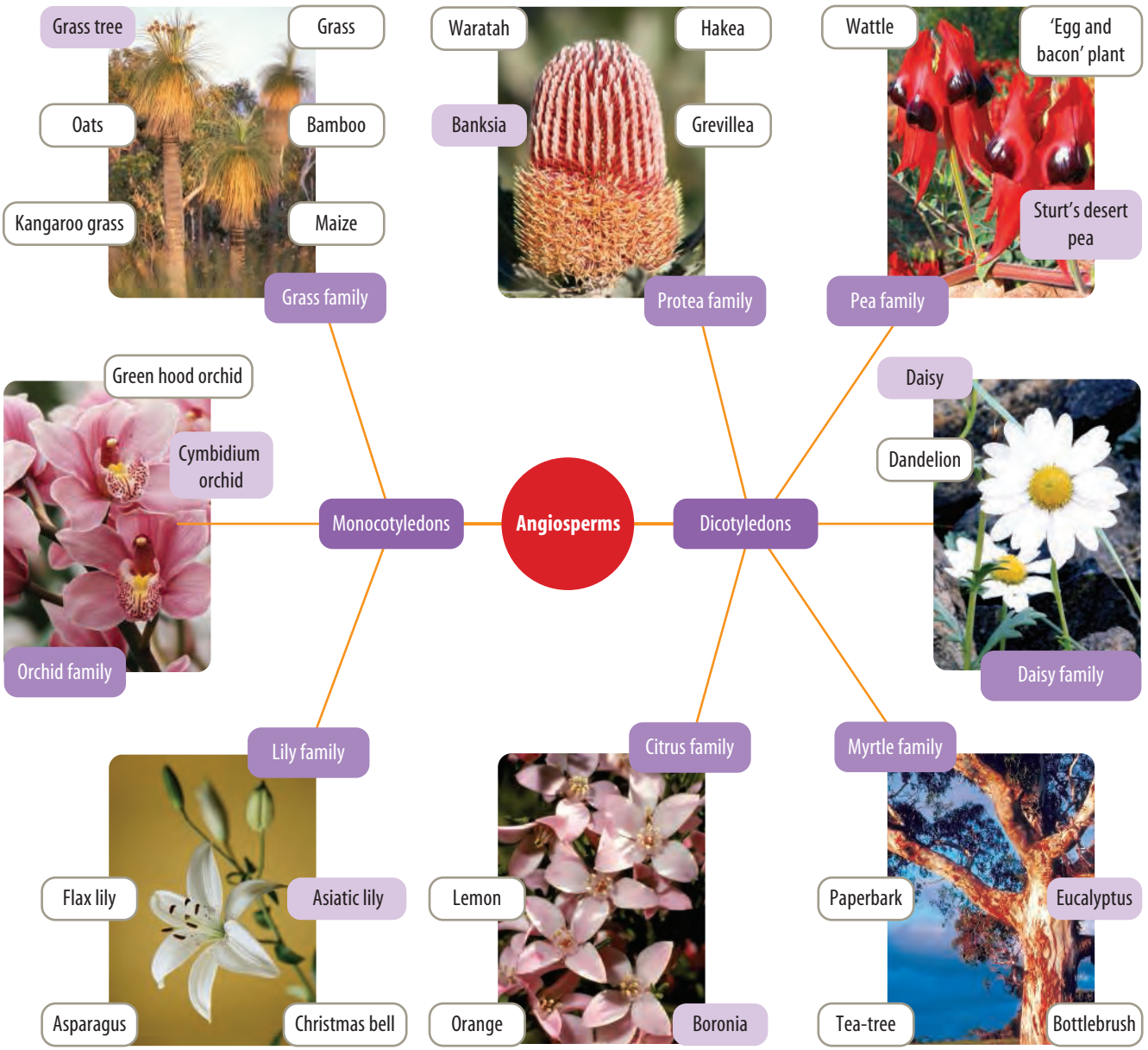
The plants that produce flowers are called **angiosperms**. Angiosperms reproduce sexually, and have flowers that produce seeds after fertilisation. Inside each seed is an embryo plant which has one or two seed leaves called cotyledons. Plants with one cotyledon are called **monocotyledons** (monocots) and those with two cotyledons are called **dicotyledons** (dicots).

HOW ABOUT THAT!

Using flowers to tell the time

You may have noticed that most flowers open in the morning and remain so throughout the day. Some plants, however, have flowers that open at particular times. Carl von Linné (1707–1778), a well known Swedish naturalist, was one of the first to study the opening and closing of flowers. He even arranged a flower clock which showed some typical opening times of flowers. Some opening times are shown in the table on the right.

Time of flower opening	Common name
4 am	Tall morning glory
5 am	Corn poppy
	Pumpkin
6 am	Fireweed
	Chicory
7 am	Coltsfoot
8 am	Marsh marigold
6 pm	Evening primrose
7 pm	Catchfly



INQUIRY: INVESTIGATION 4.9

Practising botanists

KEY INQUIRY SKILLS:

- processing and analysing data and information
- evaluating

Equipment:

5 pieces of blank A4 paper
pencil

SOME WORDS OF WARNING:

1 Be responsible in your fieldwork and handle the plant parts very gently and carefully.
2 Do not pick, break, tread, trample or climb the plants.
3 Remember that you are dealing with living things.
   - Find five plants, each with different types of flower.
   - Using a separate page for each plant:
     (a) at the top of the page
        — record your name and the date
        — record the plant's name, or, if unknown, record it as 'specimen A, B, C' etc.
        — give a general description of the location in which the plant is found.
     (b) divide the rest of your A4 sheet into three sections:
        (i) half-page sketch of a flower
        — Try to show the parts listed in the table on the opposite page and label them.
        — Count or estimate how many stamens, stigma, petals and sepals are present.
        (ii) quarter-page sketch of a leaf — include any veins that you see.
        (iii) quarter-page sketch of the plant's overall appearance.
   - Record the colour, scent (also give a mark out of 10 for its strength), and the texture and shape of the flowers, leaves and stems next to your diagrams.

DISCUSS AND EXPLAIN

1 Suggest which of the plants were likely to be pollinated by insects or the wind, or by other means. List this information in a table. Give reasons for your suggestions.
2 For those plants that you suggested were insect-pollinated, suggest a type of insect that may pollinate them. Give reasons for your suggestions.
3 Suggest which plants are monocots and which are dicots and give reasons for your suggestions.
4 What difficulties did you encounter when doing this activity? Suggest how they might be overcome (or any improvements) if you were to do it again.
5 Design a field guide, cluster map, classification key or multimedia summary that could be used to separate and describe the plants you observed.

UNDERSTANDING AND INQUIRING

REMEMBER

1 Which part of the plant is the fruit?
2 What conditions are needed for germination?
3 Why is light usually necessary only once the plant has germinated?
4 If birds eat the seeds of fruit, how can the seeds be dispersed?
5 State the names of the two main groups of angiosperm.

INVESTIGATE AND DESIGN

6 Design an experiment to see whether water affects the germination of a variety of different types of seeds.
7 Find out more about the seed dispersal of five different types of plants and report your findings in a visual map.
8 Find out more about each of the different families of plants listed in the diagram on the opposite page. Present your information in a poster.
9 Find out other differences between monocotyledons and dicotyledons and communicate your findings in a matrix table.
10 Not all plants are welcome in Australia. Some plants have been identified as Australian 'weeds of national significance'. Features shared by these plants relate to their invasiveness, their potential to spread and their effect on primary production and the environment.
   (a) Find out the names of five plants on the Australian government's list of twenty 'weeds of national significance'.
   (b) Select any plant on this list and complete the following in a brochure or electronic format.
      (i) State the common and scientific names of the plant.
      (ii) Describe the plant (include size, shape, structures and colour).
      (iii) Describe the distribution of this plant in Australia.
      (iv) Outline some interesting points about this plant.
      (v) Suggest why this plant is considered to be a weed.
      (vi) Suggest ways to control or eliminate this weed in Australia.
      (vii) Use a relations diagram or algorithm to suggest possible consequences of removing this weed from Australian ecosystems.