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STEM Project

Chapter 8: Reproducing

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Nature vs Nurture

While the genes you inherit from your mother and father determine a lot of your own traits, they don't determine everything. Factors in your environment, such as lifestyle and upbringing, will also play a big part in how you grow and develop. The genetic factors that contribute to the characteristics of an organism are called 'nature factors' and the environmental factors are called 'nurture factors'. Scientists have debated the relative importance of nature and nurture factors for decades.

Plants can also be the product of both nature and nurture. Their development will depend on the genetic makeup of their parent plants (nature) as well as the characteristics of their environment (nurture).

The nurture of sunflowers

While most sunflower seeds are not genetically identical, seeds of the same breed are very similar and produce very similar-looking seedlings. In this task, you will use genetically similar sunflower seeds to explore the impact of nurture factors on the growth and development of seedlings.

Experiment – The effect of nurture

Aim: To investigate the effect of environmental conditions on the development of sunflower plants.

Materials:

- 8 sunflower seeds
- 8 seedling pots or yoghurt tubs
- Soil
- Liquid fertiliser
- Water
- Ruler

Method:

1 Fill the eight seedling pots or yoghurt tubs with soil.

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2 Insert one sunflower seed in each pot, approximately 1 cm below the surface of the soil.

3 Separate your pots into two groups of four. Place one group in a sunny location and the other in a dark corner. Label each pot ‘sun’ or ‘no sun’.

4 Within each of these groups, separate the pots into two further subgroups of two. Add liquid fertiliser (in the manner described on the fertiliser packaging) to one of these subgroups. Label the pots with ‘fertiliser’ or ‘no fertiliser’ as appropriate.

5 Finally, for the two pots in each subgroup, water one of them well but don’t add any water to the other. Label the pots with ‘water’ or ‘no water’ as appropriate.

6 Leave your plants to grow for three weeks but add extra water to the pots labelled ‘water’ every two to three days.

7 Once a week for three weeks, measure the heights of your seedlings and record these heights in the table in the Data and results section.

Data and results

Amount of Sun	Fertiliser	Water	Growth Week 1 (cm)	Growth Week 2 (cm)	Growth Week 3 (cm)
Sunny position	Fertiliser	Water			
		No water			
	No fertiliser	Water			
		No water			
Low sunlight position	Fertiliser	Water			
		No water			
	No fertiliser	Water			
		No water			

Explore ways to represent this data graphically. Decide on the best graphical representation and display it below:

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Discussion and reflection

1 What effect does sunlight have on the growth of sunflowers?

2 What effect does fertiliser have on the growth of sunflowers?

3 What effect does water have on the growth of sunflowers?

4 What other nurture factors could affect how sunflowers grow and develop?

5 For this experiment, we assumed the sunflower seeds were genetically similar. This means we assumed that we could disregard nature factors. If this assumption of genetic similarity was incorrect, what affect could this have had on the results?

6 What nurture factors could affect how **you** grow and develop?

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7 Which factors do you think contribute more to the characteristics shown by plants and animals – nature or nurture factors? Justify your answer and provide some reasons why this is an important question.

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