

Building an Offspring

Learning Outcomes in Focus

Contextual strands: BW 2

Students should be able to describe asexual and sexual reproduction; explore patterns in the inheritance and variation of genetically controlled characteristics.

EXPLORE: Observe, study in order to establish facts.

Nature of science: NoS 4

Students should be able to produce and select data (qualitatively/quantitatively), critically analyse data to identify patterns and relationships, identify anomalous observations, draw and justify conclusions

Learning Intentions

Students will learn:

1. How phenotype and genotype relate, through observing variations in inherited characteristics.

Prior Learning

Students should have had some introduction to the language and the generalised ideas of inherited characteristics, which result from genes that are inherited from each of two parents. For the purpose of this activity it is presumed that:

- Each parent contributes one gene to the genotype (pair of genes) of offspring.
- That some genes are dominant over others
- That phenotype is the physical expression of a genotype, modelled here at its simplest - where there is a direct correlation between one genotype and one physically observable trait i.e. shape of eyes, face and mouth type.

Equipment needed

Students will work in pairs and will need the following worksheet, plus a coin with a sticker on one side.

Student Activity Sheet

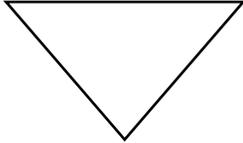
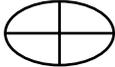
By tossing a coin you will decide which of your two genes goes forward to each of 3 offspring. You will use the resulting **genotype** to predict the **phenotype** to build a picture of each of your offspring.

- Decide who is parent 1 and who is parent 2.

In the table the **genotype** for each parent, 1 and 2, for face shape, eye shape and mouth type is listed.

	Parent 1 genotype	Parent 2 genotype
Face shape	Ff	Ff
Eye shape	Ee	Ee
Mouth type	Mm	Mm

The **phenotype** corresponding to each gene is shown below

Face shape	F		f	
Eye type	E		e	
Mouth type	M		m	

A capital letter (F, E, M) represents a dominant gene.

- Looking at your **genotype**, and using the **phenotypes** drawn above, discuss with your partner what each parent will look like. In the space below, draw a picture of parent one.

Parent one

Then, discuss with your partner whether parent two will have the same mouth type.

3. Parent 1 - flip the coin to decide which gene will go to your offspring to determine their face shape. If the coin lands on the side with a sticker it means your offspring gets a dominant gene from you (F). If it lands on the other side they get a recessive gene from you (f). Using the 1st table below, record the gene type in the appropriate space for offspring one.
4. Parent 2 now repeats the procedure by tossing the coin.
5. Record the genotype for that characteristic.
6. Repeat for each inherited characteristic and for each of 3 offspring.

Offspring 1

	Gene from parent 1	Gene from parent 1	Genotype
Face shape			
Eye type			
Mouth type			

Offspring 2

	Gene from parent 1	Gene from parent 2	Genotype
Face shape			
Eye type			
Mouth type			

Offspring 3

	Gene from parent 1	Gene from parent 2	Genotype
Face shape			
Eye type			
Mouth type			

7. Having selected the genotype for each offspring, draw a picture of what each of your offspring will look like – i.e. show the phenotype for each combination of genes.

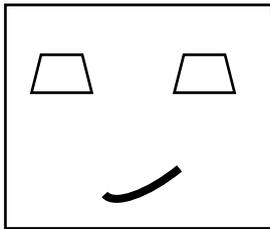
Offspring 1

Offspring 2

Offspring 3

Discuss the following ideas with your partner:

1. Does knowing the genotype allow you to predict the phenotype?
2. Does knowing the phenotype allow you to be certain about the genotype?
3. What possible genotypes could result in the phenotype shown below?



Fill in your answers:

All possible genotypes for face:

All possible genotypes for eyes:

All possible genotypes for mouth:

Possible Extension Activity

Were all possible gene combinations produced by tossing the coin? Were there any combinations which did not arise? If so draw pictures of these possible offspring in the space below.