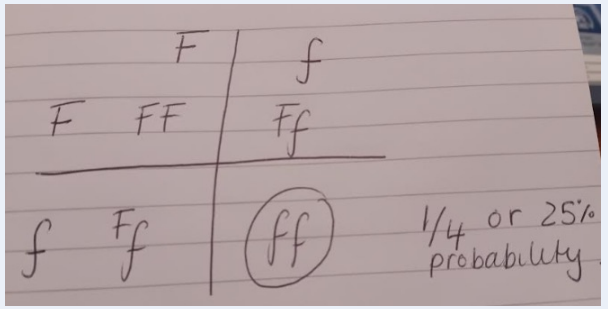
Selective Breeding

Answer the questions below.

1. Which shows a heterozygous genotype? **DD, Dd or dd**
   Dd
2. Define alleles.
   Different versions of a gene.
3. Describe the symptoms of cystic fibrosis.
   Thick, sticky mucus production, chest infections, coughs, problems with digestion
4. Cystic fibrosis is a recessive genetic disorder. Show using a genetic diagram how 2 parents without cystic fibrosis can have a child with cystic fibrosis.
   F is healthy
   f is cystic fibrosis



Do Now

Selective Breeding

Do Now:

1. Which shows a heterozygous genotype? **DD, Dd or dd**
2. Define alleles.
3. Describe the symptoms of cystic fibrosis.
4. Cystic fibrosis is a recessive genetic disorder. Show using a genetic diagram how 2 parents without cystic fibrosis can have a child with cystic fibrosis.

Drill:

1. Write 1/5 as a percentage.
2. In a dairy farm there are 48 cows and 4 bulls. Write the ratio of cows to bulls in the simplest form.
3. A dog has puppies that are black, brown or mixed in a ratio of 2:4:1. If 4 dogs are black, how many puppies were there all together?



Do Now

Selective Breeding







Read Now:

Selective breeding is the process by which humans breed plants and animals for particular desirable characteristics. For example, plants in the genus *Brassica* have been selectively bred to produce a variety of food types for people to eat. By modifying sections of a single species; *Brassica Oleracea* scientists have produced a wide variety of edible plants via selective breeding. These include broccoli (modified flower buds), cabbage (modified leaf buds) and kale (modified leaves). Artificial selection of *Brassica* can be traced back 2,000 years! This is a long time before people had knowledge of genes and inheritance.

1. What is selective breeding?
2. What desirable characteristics would be selected in the *Brassica* plant?
3. Suggest the advantage of selectively breeding plant species
4. Animals can also be selectively bred. Suggest what desirable characteristics would be selected in dairy cows.



Do Now

28/04/2024

Selective Breeding

B5.3.4

Science Mastery

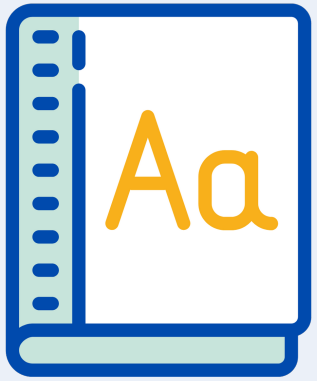


B5.3.1 Prior Knowledge Review
B5.3.2 The Human Genome
B5.3.3 Prior Knowledge Review: Inherited Disorders
➢ **B5.3.4 Selective Breeding**
B5.3.5 The Use of Genetic Engineering
B5.3.6 (HT) The Process of Genetic Engineering
B5.3.7 Therapeutic Cloning and Stem Cells
B5.3.8 Taking it Further: Cloning
B5.3.9 Taking it Further: Using Plant Hormones

Following this lesson, students will be able to:

- Describe the process of selective breeding
- Describe how humans have used selective breeding
- Evaluate the benefits and risks of selective breeding

Key Words:



desirable **breeding** **trait**

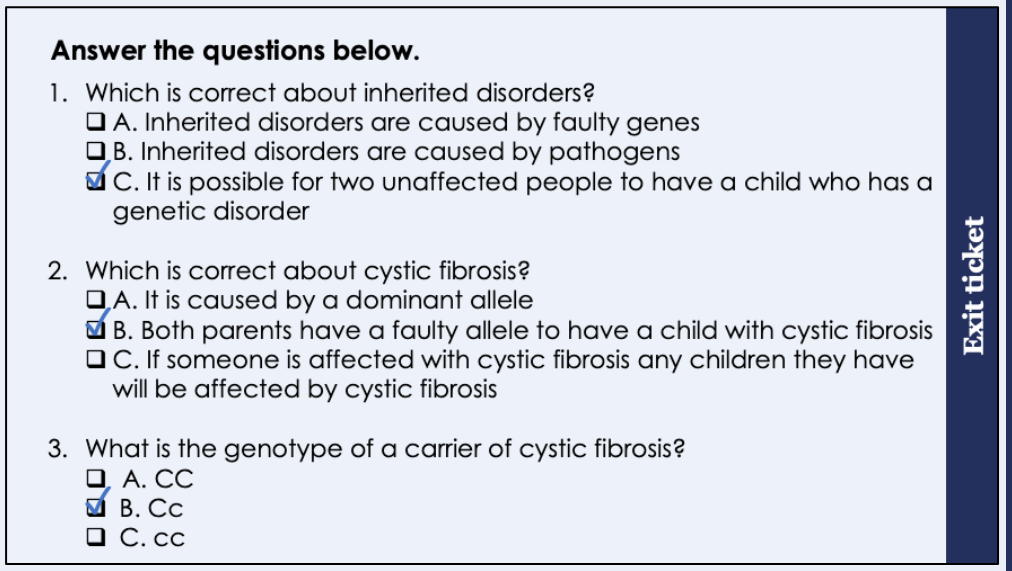
characteristic

Lesson Objectives

This is the fix-it portion of the lesson

The **fix-it** is an opportunity to respond to gaps in knowledge, especially those identified by the previous lesson's exit ticket.

- The teacher should customise this slide as needed, to facilitate
  - **reteach**, **explanation, demonstration** or **modelling** of ideas and concepts that students have not yet grasped or have misunderstood.
  - **practise** answering specific questions or of key skills.
  - **redrafting** or **improving** previous work.



Answer the questions below.

1. Which is correct about inherited disorders?
   - ☐ A. Inherited disorders are caused by faulty genes
   - ☐ B. Inherited disorders are caused by pathogens
   - ☑ C. It is possible for two unaffected people to have a child who has a genetic disorder

2. Which is correct about cystic fibrosis?
   - ☐ A. It is caused by a dominant allele
   - ☑ B. Both parents have a faulty allele to have a child with cystic fibrosis
   - ☐ C. If someone is affected with cystic fibrosis any children they have will be affected by cystic fibrosis

3. What is the genotype of a carrier of cystic fibrosis?
   - ☐ A. CC
   - ☑ B. Cc
   - ☐ C. cc

Exit ticket

Fix-it

Selective Breeding

Did you know?
The grey wolf is the closest living relative of the dog

Selective breeding is also known as **artificial selection.**

It is the process by which humans breed plants and animals for particular **genetic characteristics.**

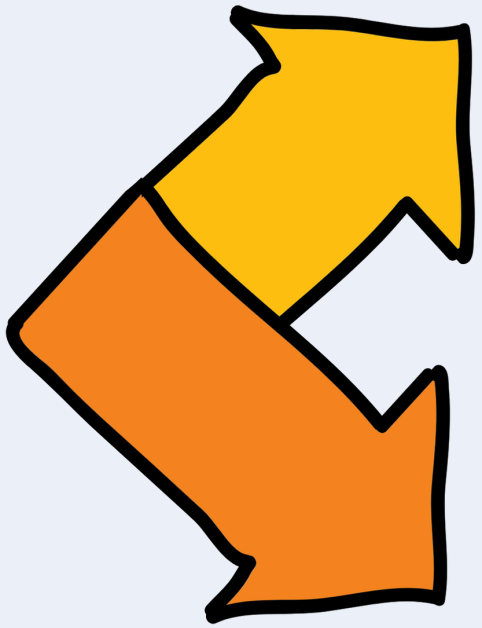
Characteristics can be chosen for **usefulness** or **appearance**:

- Disease resistance in food crops
- Animals which produce more meat or milk
- Domestic dogs with a gentle nature
- Large or unusual flowers



Selective breeding is the process by which humans breed plants and animals for particular **genetic characteristics**

Can you describe the difference between these two processes?



Natural selection

Artificial selection

Key words:
Humans, competition, genes, characteristics, mutation, advantage, breed, next generation

Talk Task

Selective Breeding

Selective breeding is also known as 'Artificial Selection'

Task: Decide whether these statements are describing Natural Selection or Artificial Selection.

1. Female peacocks chose to mate with male peacocks with the largest feathers
2. Some bacteria have become resistant to antibiotics
3. Chickens have been bred to have larger breast meat
4. Flowers have been bred to have unusual colour patterns

SUPPORT:

Natural: Competition

Artificial: Controlled by humans

Artificial Selection	Natural Selection

Check for understanding

Selective Breeding

Selective breeding is also known as 'Artificial Selection'

Task: Decide whether these statements are describing Natural Selection or Artificial Selection.

1. Female peacocks chose to mate with male peacocks with the largest feathers
2. Some bacteria have become resistant to antibiotics
3. Chickens have been bred to have larger breast meat
4. Flowers have been bred to have unusual colour patterns

SUPPORT:

Natural: Competition

Artificial: Controlled by humans

Check for understanding

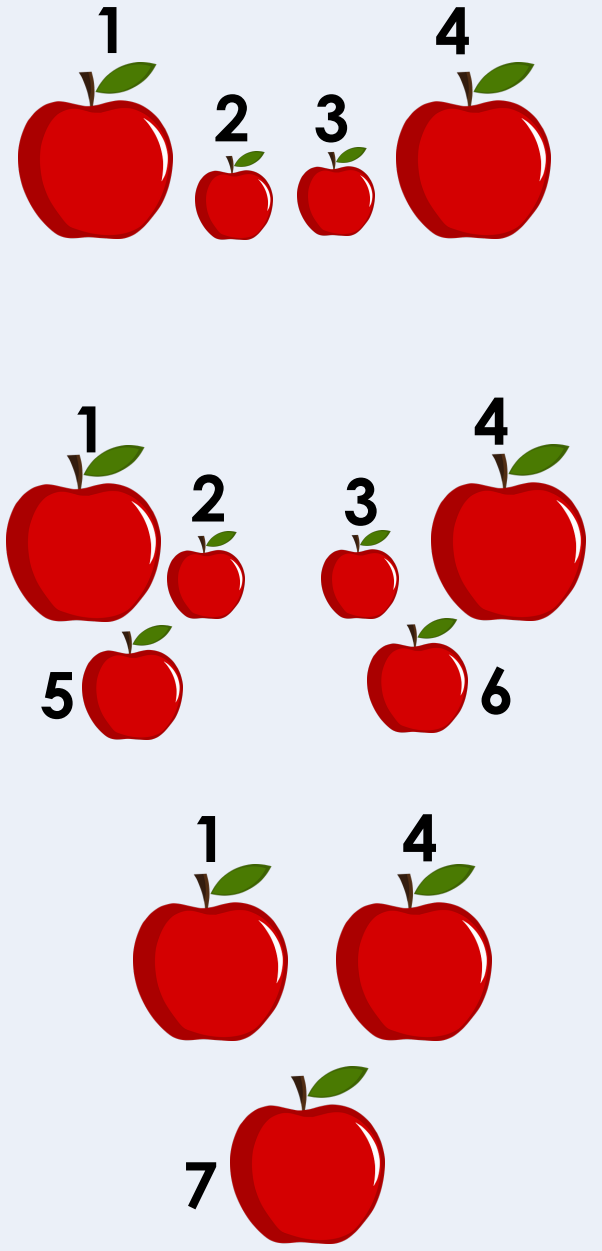
Artificial Selection	Natural Selection
3	1
4	2

The process of selective breeding

1. Humans choose the parents with the **desired characteristics** from a mixed population

2. From the offspring, those with desired characteristic are bred together

3. This continues over **many generations** until all the offspring show the desired characteristic



Is this correct?

A farmer wanted sheep that produced a lot of wool.
The farmer completed this process:

1. In a mixed population, the farmer chose 2 sheep that produced a lot of wool and bred them together
2. All the offspring produced a lot of wool

Talk Task

I: Describe: *to recall facts, events or processes in an accurate way*

Example question:

This question is about selective breeding.
A farmer wanted to breed larger chickens.
Describe the process the farmer used to get this desirable characteristic

Model answer:

- From a **mixed population**, the farmer picked a chickens that were large and bred them together
- From the offspring, the **farmer selected** the largest chickens and bred them together again
- This process continues over **many generations**

To 'describe', your answer should:

- Use **bullet points** to keep your answer clear
- Cover enough points to **fully answer** the question
- Use scientific **keywords** in your answer
- '**Say what you see**' if there is a diagram, graph or table.



We: Describe: *to recall facts, events or processes in an accurate way*

Example question:

Plants have been bred to produce flowers with bright colours.

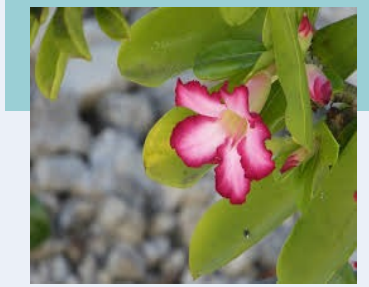
Describe the process used to produce flowers with bright colours.

Model answer:

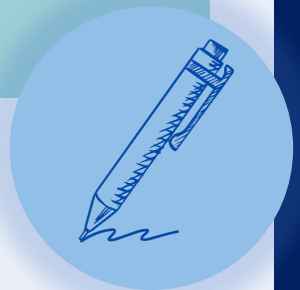
- From a **mixed population**, the plants with the brightest colours were picked and bred together
- From the offspring, the plants with the brightest colours were picked again and bred together
- This process continues over **many generations**

To 'describe', your answer should:

- Use **bullet points** to keep your answer clear
- Cover enough points to **fully answer** the question
- Use scientific **keywords** in your answer
- '**Say what you see**' if there is a diagram, graph or table.







Writing like a scientist

You: Describe: *to recall facts, events or processes in an accurate way*

Example question:

Cows have been bred to produce lots of milk.

Describe the process used to produce cows that produce lots of milk.

Model answer:

- From a **mixed population**, the cows that produce the most milk were picked and bred together
- From the offspring, the cows that produce the most milk were picked again and bred together
- This process continues over **many generations**

To 'describe', your answer should:

- Use **bullet points** to keep your answer clear
- Cover enough points to **fully answer** the question
- Use scientific **keywords** in your answer
- '**Say what you see**' if there is a diagram, graph or table.



Problems with Selective Breeding

Selective breeding involves breeding organisms with very similar genetic material together.



This can lead to **inbreeding.**

Selective breeding has some ethical considerations:

- Animals can be bred to have unnatural characteristics
- Inbreeding increases chances of genetic mutations
- Inbreeding decreases genetic variation

Ethics describes the principals of what is right and what is wrong.

Which statements do you agree with?

Selective breeding can help farmers maintain profit

Selective breeding can eliminate animals and plants with genetic disorders from a population

Animals don't choose to be selectively bred so it is against animal rights

Selective breeding causes damage to organisms through inbreeding

Talk Task

Answer the questions below.

1. Which feature would flowers be selectively bred for?
   - ☐ A. Large production of pollen
   - ☑ B. Bright and unusual coloured flowers
   - ☐ C. Large leaves

2. Which is the first step of selective breeding?
   - ☑ A. In a mixed population, organisms with the desired characteristics are selected
   - ☐ B. This is repeated for many generations
   - ☐ C. Offspring with desired characteristics are selected and bred together

3. What is the advantage of selectively breeding for pest resistant crops?
   - ☐ A. Crops will have more nutrients
   - ☑ B. Farmers do not have to use pesticides
   - ☐ C. Crops will last longer

Exit ticket

Feedback

Lesson B5.3.4	
What was good about this lesson?	What can we do to improve this lesson?

Send us your feedback by clicking this link
or by emailing sciencemastery@arkonline.org
Thank you!