# Lesson Element

# Asexual and sexual reproduction

## Instructions and answers for teachers

These instructions cover the learner activity section which can be found on [page 5](#_Learner_Activity). This Lesson Element supports OCR GCSE (9–1) Gateway Science Biology A and the Twenty First Century Science Biology B qualifications.

**When distributing the activity section to the learners either as a printed copy or as a Word file you will need to remove the teacher instructions section.**

### Mapping to specification level (Learning outcomes)

**GCSE (9–1) Gateway Science Biology A**

B5.1f explain some of the advantages and disadvantages of asexual and sexual reproduction in a range of organisms

**GCSE (9–1) Twenty First Century Science Biology B**

B6.2.1 explain some of the advantages and disadvantages of asexual and sexual reproduction in a range of organisms

### Supporting information

To save time during the activity, the teacher could pre-cut (and maybe laminate) the cards. To save paper learners could draw out the tables into their books.

For help with the extension activity questions teachers should ensure that textbooks are available or that there is access to ICT for learners to research their answers.

### Introduction

**Summary of the activity**

This activity is designed to be used as a consolidation tool. Learners should have covered all the key aspects of the differences between sexual and asexual reproduction; how the processes occur and what the outcome of each type of reproduction is.

**Prior knowledge**

Learners need to be aware that inheritance relies on the genetic information contained in the genome being passed from one generation to the next, whether sexually or asexually. The characteristics of a living organism are influenced by the genome and its interaction with the environment.

Learners need to know the processes of sexual and asexual reproduction. They should be aware of the processes of mitosis and meiosis and the difference between them.

Learners should also be clear on the different outcome of each type of reproduction.

**Misconceptions**

Learners often have the misconception that sexual reproduction always involves sexual intercourse. They can also sometimes think that asexual reproduction is just done by bacteria. Learners often think that sexual reproduction is always better than asexual. This resource aims to help with these misconceptions. By outlining the differences between asexual and sexual reproduction and stressing the advantages of each method learners can discuss how and why a wide range of organisms use asexual reproduction, including many plant and some animal species.

### Running the activity

Learners could work individually or in pairs.

### Task 1

Learners should cut out the boxes and arrange them into the correct columns.

Depending on how the activity is delivered (either a revision task or a learning aid) learners could either use their notes to help or use guided discussion with their partner or teacher to help place the cards.

**Suggested answers:**

|  |  |
| --- | --- |
| **Sexual** | **Asexual** |
| 2 parents needed  Adaptable to environmental change  Slow  Offspring are a genetic mix of both parents  Involves specialised sex cells  Lots of energy needed | Only 1 parent needed  Limited ability to adapt  Quick  Offspring genetically identical to parents  Involves somatic cells  Does not need much energy |

### Task 2

Once Task 1 is complete, learners should then use the same cut out cards to fill in the table on Task 2.

There is then a second set of cards that learners should cut out and match with the cards already in place in the table on Task 2.

These boxes are intended to help learners expand on the reasons for the first set of cards in the table.

Learners could use this as a prompt for discussion as to the reasons why certain points are an advantage or a disadvantage for either type of reproduction.

Suggested answers (additional boxes indicated in red):

|  |  |
| --- | --- |
| Sexual meiosis | Asexual mitosis |
| Advantages | Advantages |
| Adaptable to environmental change - some of the population may survive even after a change in environmental conditions  Offspring are a genetic mix of both parents –genetic diversity | Only 1 parent needed – reproduction can happen at any time  Quick – can produce a large population in a short time  Does not need much energy – few resources required |
| Disadvantages | Disadvantages |
| Slow – can only produce a small population in a short time  Lots of energy needed – requires more resources  2 parents needed – Reproduction requires both parents to be together, mature and fertile | Limited ability to adapt – whole population could die off if their environment changes  Offspring genetically identical to parents – no genetic diversity |

Note the boxes ‘Involves somatic cells’ and ‘Involves specialised sex cells’ could be used to initiate a classroom discussion as to their relative advantages and disadvantages.

### Task 3 – Extension activity

As a summary activity and an extension to the tables Task 3 provides a series of questions. Some are purely revision others provide pointers for further study. Textbooks should be provided (or access to ICT) for learners to research their answers.

**Answers:**

Give five examples of organism types that go through sexual reproduction

Any suitable answer eg: mammals, fish, birds, amphibians, reptiles, bacteria, fungi etc.

2. What is a mutation?

A change in the sequence of DNA which can lead to a different phenotype.

3. What can cause a mutation?

Physical change to the DNA molecule (eg mechanical breakage), chemicals (eg sodium azide – used in airbags, some metals etc.), biological agents (eg retroviruses), UV, ionizing radiation and base analogues.

4. Name three organism types that can go through asexual reproduction

Plants, Bacteria, Fungi

5. Name four forms of asexual reproduction?

Budding, runners, fragmentation, binary fisson

6. What form reproduction uses mitosis and what form uses meiosis (sexual/asexual)?

mitosis = asexual, meiosis = sexual

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## Learner Activity

### Task 1

Cut these cards out and place into the correct columns in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| **Only 1 parent needed** | **Limited ability to adapt** | **Offspring genetically identical to parents** | **2 parents needed** |
| **Quick** | **Involves somatic cells** | **Offspring are a genetic mix of both parents** | **Slow** |
| **Involves specialised sex cells** | **Adaptable to environmental change** | **Lots of energy needed** | **Does not need much energy** |

|  |  |
| --- | --- |
| **Sexual** | **Asexual** |
|  |  |

### Task 2

Use the cards you have cut out for task 1 and place them into the correct section of the table below – this time place the cards into the **advantage** or **disadvantage** section within the column.

|  |  |
| --- | --- |
| **Sexual** | **Asexual** |
| Advantage | Advantage |
|  |  |
| Disadvantage | Disadvantage |
|  |  |

Now cut out these cards and place them next to the relevant cards already placed in your table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Whole population could die off if their environment changes** | **Mitosis** | **Meiosis** | **Some of the population may survive even after a change in environmental conditions** |
| **Requires more resources** | **Few resources required** | **No genetic diversity** | **Genetic diversity** |
| **Can only produce a small population in a short time** | **Can produce a large population in a short time** | **Reproduction can happen at any time** | **Reproduction requires both parents to be together, mature and fertile** |

### Task 3 – extension questions

1. Give five examples of organisms that can go through sexual reproduction.

a)

b)

c)

d)

e)

2. What is a mutation?

3. What can cause a mutation?

4. Name three organism types that can go through asexual reproduction.

a)

b)

c)

5. Name four forms of asexual reproduction?

a)

b)

c)

d)

6. What form of reproduction uses mitosis and what form uses meiosis (sexual/asexual)?