Inheritance, Variation and Evolution: Reproduction and Meiosis
Teaching Ideas

Learning Objective:	To explain how gametes are formed. **Targeting Assessment Objective AO1**
Success Criteria:	• To describe the difference between sexual and asexual reproduction. • To discuss the advantages of each type of reproduction. • To explain the difference between mitosis and meiosis.
Context:	This is the first lesson of the Inheritance, Variation and Evolution unit. The lesson recaps learning from mitosis, the cell cycle and specialised cells.

Starter

Reproduction

The slide shows a variety of organisms and asks students how they reproduce. The cats, birds (eggs and sperm) and horse chestnut tree (pollen and eggs) reproduce sexually, while the bacteria (binary fission) and strawberry plant (runners) reproduce asexually.

Main Activities

Sexual Reproduction

Key facts about sexual reproduction are given. Students are asked what the gametes in animals are called. They should have covered these in the cells unit. On a click, illustrations of these cells will appear for students to name; on the second click their labels will appear. This is a good time to recap which organs produce these cells. On the third click students are told that human gametes contain 23 chromosomes, this is a figure they need to remember.

Sperm Cell Revision

This slide gives you the opportunity to recap what students learnt about the sperm cell in the specialised cells topic. The slide shows an illustration of a sperm cell and students are asked how it is specialised to carry out its functions. These will appear as bullets on clicks. There is space for students to record these adaptations on the **Reproduction Activity Sheet**.

Sexual Reproduction in Plants

This slide reinforces the key points about sexual reproduction using plants as an example and shows students what the gametes in plants are.

Asexual Reproduction

This slide gives the main facts about asexual reproduction. There are four example illustrations given on the slide for you to discuss in more detail if you want to.

1. Strawberry plants can reproduce sexually, but they also send out runners that grow identical daughter plants.
2. Fungi release spores which are carried by the wind or animals to other locations.
3. Daffodil bulbs divide to produce identical daffodils that appear to grow in one bunch.
4. Bacteria divide by binary fission – one cell duplicates its genetic material and then divides in two.

The **Reproduction Activity Sheet** asks students to explain the difference between sexual and asexual reproduction.

Advantages of Reproduction Types

The slide gives information about four different organisms. Students are asked to think about whether sexual or asexual reproduction might be best in these situations. At this point you're just looking for them making some suggestions. They might recognise that asexual reproduction would be quicker and use less energy; they might recognise that the variation provided by sexual reproduction will be useful in changing environments. You could offer prompts to help them come to these conclusions.

You can then give them the advantages of each type of reproduction. There is space for them to record these on their **Reproduction Activity Sheet**. The following slide gives the information about the organisms again and you could ask students to justify their reproduction choice for each organism using the information they now have.

The Best of Both Worlds

The slides give information on the four organisms from the specification that students need to recall. These organisms can reproduce both sexually and asexually.

When covering the malaria parasite, you might want to recap the knowledge students should already have about the spread of malaria from the infection and response unit.

The fungi slide asks students to think about why they carry out sexual reproduction only when conditions are not favourable – sexual reproduction will introduce variation to the offspring which may produce individuals more able to survive in the changing environment.

The plant slide poses some discussion questions. You may wish to pause each time a question is asked, or ask for feedback at the end of the slide. The answers given should include the main points: how flowers are adapted for pollination – they are bright to attract insects to carry pollen, or they contain pollen that is easily carried by the wind to other flowers. Why plants might need to reproduce asexually instead – if there is frost or they are damaged so that sexual reproduction doesn't occur (or they fail to be pollinated), then asexual reproduction allows them to reproduce anyway. Disadvantages of asexual reproduction – this is that there is no variation, so they won't be able to adapt to unfavourable conditions.

There are questions on the **Reproduction Activity Sheet** that cover this content.

Mitosis vs Meiosis

Students will have covered mitosis previously. This is a good opportunity for them to recap their prior learning. You could ask the class to write down what they can remember about mitosis, or ask them to draw a diagram on whiteboards or scrap paper in their groups. Ideally, they will recall that the cells grow and replicate their DNA so that there are two copies of each chromosome. Also that one set of chromosomes is pulled to each side of the cell and that the cell then divides into two identical daughter cells.

On a click a diagram of mitosis will appear for students to compare with their ideas. This will give you an opportunity to highlight the things they should already know.

At this point you could ask students how many chromosomes will be in the daughter cells produced by mitosis, then remind them that there are only 23 in gametes so can they suggest how gametes might be produced?

On a second click a diagram of meiosis will appear. Ask students what differences they notice between the two.

The **Mitosis vs Meiosis Cards** provide statements about each type of division for students to sort. There is space to record the differences between the two types of division in a table on the **Reproduction Activity Sheet**. Alternatively, the slide provides the statements instead of using the cards and the completed table is shown on the following slide for students to mark their work.

Practice Exam Questions

The **Exam Questions Activity Sheet** gives eight exam questions based on this topic. The questions test the students use of the keywords from this lesson and practise identifying the number of chromosomes present in different cell types. The final question is an extended writing question that asks students to compare mitosis and meiosis. You may want to reinforce to students what is expected with the command word compare – the slide gives some support with this.

Plenary

Meiosis or Mitosis?

Each slide has a statement about mitosis or meiosis. Students need to indicate which type of division the statement refers to. You could give students different coloured cards to hold up, they could write mitosis on one side of a whiteboard and mitosis on the other, or they could put up a hand for one and a book for the other. You could ask the whole class to respond, or you could pick smaller groups of students.

Homework

There is a homework grid available for the Inheritance, Variation and Evolution unit that includes activities suitable to follow this lesson.