Key Stage 4 – Cooperate or compete?

Notes for teachers

At a glance

Some groups of organisms live in harmony, sharing and helping each other. Whilst others fight for their share of resources – what drives organisms to cooperate or compete?

In this lesson students find out why the work of microbiologists at The University of Oxford is helping to answer this question.

This lesson is best used after students have studied competition between organisms. The main activity can be carried out for homework.

Learning Outcomes

- Students carry out independent research
- Students understand why organisms cooperate and compete

Each student will need

- Copy of student worksheet
- Access to the Cooperate or compete PowerPoint and the internet

https://www.oxfordsparks.ox.ac.uk/content/bacteria-safari-forest-your-fingernail
Possible Lesson Activities

1. Starter activity
   - Display slide 2 of the Cooperate or compete? PowerPoint presentation. Ask students how the two images show cooperation and competition and why these two strategies are used.
     *The lions in a pride cooperate to hunt for prey, care for the young etc. These help the lions to survive. However, lions in different prides will compete for resources and many fight to protect their territory. The goats are showing competition – this is a display of strength. The goats are competing for a mate.*
   - Ask them to discuss the question on the slide in pairs: ‘What do you think determines this choice?’ Go through their thoughts.
     *Organisms compete if resources are limited. Organisms usually cooperate in groups where they have genetic similarities e.g., families. This strategy helps survival and the passing on of their genetic material to offspring. It is the same reason why humans are more protective of family members than strangers.*

2. Main activity: Finding out more
   - Inform the students that it is just not animals that can compete or cooperate – so can bacteria. Studying bacteria helps scientists at The University of Oxford to understand larger ecosystems and how these survival strategies play a role. Play the animation ‘Bacteria Safari: The Forest on your Fingernail’, which introduces this research.
   - Supply each students with access to the Powerpoint and the internet or supply them with the URL of the presentation online (see weblinks). Each student will get their own copy of the presentation (the original will not be affected when they type on it). Alternatively, you can print out the Powerpoint and give it to the students as a worksheet and play the videos to the whole class.
   - Students then work independently to complete the questions on the presentation. They are first given an example of cooperation and competition in an animal (ants) and then use this information to work out how bacteria use these strategies.

3. Plenary
   - Show the class an image of ‘Fleming’s plate’ (see weblinks).
   - Ask them how this shows both cooperation and competition in microorganisms. (the bacteria and fungi both grow in colonies, which share resources. However, the fungi and bacteria are competing for resources. The fungi produces an antibiotic, which kills the bacteria).
   - Discuss why antibiotics can only be used to treat bacterial, not viral, infections.

Weblinks

Oxford Sparks animation:

[https://www.oxfordsparks.ox.ac.uk/content/bacteria-safari-forest-your-fingernail](https://www.oxfordsparks.ox.ac.uk/content/bacteria-safari-forest-your-fingernail)

Cooperate or compete? Online presentation

Fleming’s plate

https://www.sciencesource.com/archive/-SS2780960.html