

Teacher's Guide: The Planarian Lab

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Overview: The curriculum is designed to give students basic knowledge of asexual and sexual reproduction. The lab allows them to observe asexual reproduction.

Subject: Life Science, Biology.

Audience: 8th grade mixed ability or advanced 7th grade

Time required:

- Sections A, B, C and D (questions 1-3): 1 ½, 40-minute periods
- Lecture on Sexual and Asexual Reproduction – 2, 40-minute periods
- Section D (questions 4 -7) and Section E (parts 1-3): 1, 40-minute period
- Section E (question 4) and Section F – 1, 40-minute period
- Daily measuring and observation (Section G) – 10 minutes a day over 2 weeks
- Section H and wrap-up discussion – 1 40-minute period

Total: 6 ½ periods plus 10 minutes per day over 2 weeks. Sections B – E should occur consecutively.

Additional Assignment

- Poster project – Students will need one week to complete the posters. This can be done during class time or at home.
- Have students graph the growth of planaria over time for the two week period.

Background:

This lab assumes the students have already learned about cells and cellular reproduction and some basic knowledge of graphing and taking measurements. This lab requires that students use sharp knives in order to cut the planaria. There should be a lecture on safety prior to starting the lab.

Learning Objectives

Skills

Students will:

- Conduct guided scientific research that challenges them to use what they know as the basis for making an “educated guess” (or hypothesis).

- Collaboratively generate ideas and critically analyze their predictions based on their results
- Carefully document their observations
- Write summaries that outline their questions and predictions, methods, and results, and the comparison of their predictions to their results
- Present ideas and observations to classmates in a formal presentation

Concepts

Students will understand:

- The difference between sexual and asexual reproduction
- Why some organisms reproduce asexually
- What certain organisms need to survive

National Science Education Standards Addressed

Unifying Concepts and Process

- Evidence, models, and explanation
- Change, constancy, and measurement

Science as Inquiry

- Abilities necessary to do scientific inquiry

Life Science

- Reproduction and heredity
- Population and ecosystems
- Diversity and adaptation of organisms

Assessment Strategy

Students should be evaluated on the completeness and thoughtfulness of their answers, using categories such as those in the table below. In the class this was developed for, students who were considered low achievers were able to do well on this lab when the pressure of right or wrong was removed. You may want to give examples of what is a complete answer and what is unacceptable.

Each criterion is based on a point system from 1-5, with 1 = low and 5 = high.	
Is the lab complete?	_____
Neatness	_____
Completed on time	_____
Pictures were accurately drawn and parts were labeled	_____
Thoughtfulness of prediction and conclusion	_____
Total points	_____

Teaching Tips:

1. Section B. Start with the pre-lab questions on the planarian lab. This is to see what background information students already have about reproduction. Give students about 5 minutes to answer the questions on their own. If students are apprehensive about writing down answers ask them leading questions like, "If I want a baby pig what do I need?" and then let them think.
2. Section C. This is the class discussion section of the planarian lab. Ask students to share their answers. Next give students a formal definition of asexual and sexual reproduction so they can write it on their lab sheets.
3. Lecture 1. Give students a formal lecture on asexual and sexual reproduction. This can include any handouts or notes from their textbooks. End the lecture by giving them a copy of the planarian information sheet. You can pick students to read sections of the sheet aloud.
4. Section D. Divide students into the groups they will be in for the lab. Based on their class notes on planaria and regeneration, have them brainstorm the answers to the group discussion. At the end of the period have class discuss the answers they came up with as a group.
5. Section G. It will take about a week and a half for the planaria to regenerate so at the beginning of each class have students spend about 10 minutes observing and measuring their planaria.
6. Section H. At the end of regeneration, have the students draw a final picture of their planarian and compare their predictions to what they observed.

Potential Problems

Some of the students' planaria may die before the end of the regeneration process. If this occurs have students write what they think happened to their planarian and what they would do differently to ensure that their planarian would not die if they were to do the experiment again. You can then place those students in other groups so they do not miss the opportunity to observe and identify the results.

Model Answers To Worksheet Questions

B. Pre-lab Questions

On your own, answer the questions below.

1. What do you think asexual reproduction is?
2. What do you think sexual reproduction is?
3. How many parent cells do you think are needed for asexual reproduction?
Sexual reproduction?

1 parent cell for asexual reproduction and 2 parent cells for sexual reproduction.

C. Class Discussion:

Please write the definition given to you by the teacher.

Asexual reproduction

One 1 parent cell is needed. First the internal structures of the cell are copied by a process known as mitosis. The parent cell then divides, producing new cells that are exact copies of the parent cell. Most single-celled organisms reproduce this way. Your cells reproduce this way. It doesn't require sperm or eggs. Some forms of asexual reproduction are referred to as cloning.

Sexual reproduction

Two parent cells join to form a new individual.

D. Group Discussion

In your groups, please answer the following questions:

1. Name 5 organisms that reproduce asexually?

Strawberries, potatoes, starfish, bacteria, bread-mold, yeast and moss

2. What might be some advantages and disadvantages of reproducing asexually?

Advantages: doesn't require sperm or egg, no fertilization, simple process, less energy, all genetic material is passed to the next generation, may increase the number of individuals of a species when asexual reproduction is not possible

Disadvantage: doesn't allow for genetic variation.

3. Why might it be beneficial for plants to reproduce asexually? How might this be done? Where?

It is beneficial because it guarantees the product that has the desired genes. "Cutting" is a method of asexual reproduction in plants. (For example, you can take the branches of some plants, put them in dirt, and they will grow new roots. In essence, they are new, asexually-reproduced plants.)

4. What are planarians?

Planarian are flatworms, in the Platyhelminthes phylum.

5. Where do they live?

They live in lakes, ponds and streams where there is fresh water.

6. What are considered their anterior and posterior ends?

Anterior is the end near the eyespots. The posterior is the end with the tail.