

Name: _____

Class: _____

Date: _____

Do Microbes Help or Hinder Germination?
Student Worksheet

Student Roles and Questions Handout

Game Roles: As a group discuss which roles each member will play in the group activity. You will need one game organizer, 1-2 score keepers and 1-2 rule keepers. List names below.

_____ **Game Organizer:** Keeps the group on task. Pays attention to time.

_____ **Dealer:** Separates plant seed cards from the endophyte cards (microbes, pathogens, and climate change) and manage discard pile. Shuffle cards between games.

_____ **Rule keeper(s):** Look up the rules as questions arise.

_____ **Score Keeper(s):** Help your group to tally the scores for each round and keep score.

Game Questions (pre-game and post-game)

BEFORE YOU PLAY THE GAME, answer the questions below.

1. Answer the question, "Do microbes help or hinder plants?"
2. Read the Game Terminology. Discuss with your group some of the key ideas and some unfamiliar terms. List 2 terms discussed and what was new to you.

Glorious Germination Game

AFTER YOU PLAY THE GAME, answer the questions below.

3. Summarize the results from the games played. Which seeds won and why?
4. What types of interactions did you observe in the game?
5. Because this was a game, there are many real-life processes that were not portrayed in the game. What other factors might influence seed germination? Would these factors promote germination or hinder germination?

Glorious Germination Game

6. You most likely have never heard of endophytes before playing this game. What surprised you about these organisms? What else do you want to know about endophytes?
7. Seeds today are facing many challenges both in agriculture and in our natural habitats. Disease and environmental stressors (such as drought, heat, and abrupt freezes) reduce germination and seedling growth. Climate change is only going to make these stressors more of a challenge. If you could design an endophyte to help seeds in the future, which traits would you give the endophyte and why? Explain your response.
8. List and describe three things that you learned today about pathogens.

Glorious Germination Game

Score Sheet

For each round in a game, record the number of negative numbers, reducing your days to germination, and positive numbers, adding days to germination. Each endophyte's impact gets counted for each round as they stay with the seed for the entire game.

GAME 1 Player's name and seed type	# days to germinate	Round1	Round2	Round3	Round4	Round5	Round6	Winner	Key microbe interactions
Ex. Sally – Birch tree	25	23	22	22	21	18	16	No	Got a pathogen.
1									
2									
3									
4									
5									

GAME 2 Player's name and seed type	# days to germinate	Round1	Round2	Round3	Round4	Round5	Round6	Winner	Key microbe interactions
1									
2									
3									
4									
5									

Glorious Germination Game

Score Sheet

For each round in a game, record the number of negative numbers, reducing your days to germination, and positive numbers, adding days to germination. Each endophyte's impact gets counted for each round as they stay with the seed for the entire game.

GAME 3 Player's name and seed type	# days to germinate	Round1	Round2	Round3	Round4	Round5	Round6	Winner	Key microbe interactions
Ex. Sally – Birch tree	25	23	22	22	21	18	16	No	Got a pathogen.
1									
2									
3									
4									
5									

GAME 4 Player's name and seed type	# days to germinate	Round1	Round2	Round3	Round4	Round5	Round6	Winner	Key microbe interactions
1									
2									
3									
4									
5									