

# ***Farmer in the Sky* Lesson Plans**

By  
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## **Introduction:**

*Farmer in the Sky* is the fourth of the juveniles Robert Heinlein wrote from the late forties through the early sixties. The series is widely regarded as the finest science fiction ever written for young people; many, including Grandmaster Jack Williamson, believe them to be the best science fiction Robert Heinlein ever wrote.

I would highly recommend using *Farmer in the Sky* in life science classes, wherein the difficulties of producing the necessities for life itself can be experimented with. If your school has an agricultural program, *Farmer in the Sky* is a perfect fit. I have used it in classes to discuss the issues of overpopulation and Malthusian economics. As the novel was written with Boy Scouts in mind, the vocabulary seems to have been restricted more than Heinlein normally did.

We hope you find the following lesson plans helpful, and that you will choose *Farmer in the Sky* or another Heinlein work to use in your classrooms. We would like to hear from you about your own experiences using Heinlein's works. Please email us!

## **Edition Used:**

I have used the 1975 Del Rey paperback edition, as it is the most readily available.

## **Date of Publication / Dedication:**

*Farmer in the Sky* was finished in September 1949, and published for the Christmas trade in 1950. A shorter version also appeared in *Boys' Life* from August through November 1950. Interestingly, Heinlein wrote this while he was simultaneously working on the groundbreaking science fiction film, *Destination Moon*.

## **Chapter Summaries / Discussion Notes:**

Each chapter will be summarized, and pertinent details and issues explicated. Any of the details might be turned into extra credit questions, which require the student to do research on the internet or in a library. Heinlein often inserted historical, scientific, and literary references into his novels, as a way of gently urging the reader to explore these references. Vocabulary words which students may have difficulty with will be suggested, with particular attention paid to words Heinlein invented (which, unless we've adopted the word, won't be found in a dictionary).

I strongly urge that students learn vocabulary not by checking the dictionary, but by the following procedure: 1) say the word aloud (this begins to fix the word in long-term memory); 2) look for roots (Spanish speakers often have an advantage here, since the longer Latinate words in English often have a simple Spanish root, as in the word "facilitate"; 3) use context to make TWO guesses as to what the word means; 4) then, and

only then, check the dictionary. Students need to be reminded to learn new vocabulary words, because they will often choose to simply skip the word they don't know, or in running to the dictionary, will fail to permanently learn the new word as they only place the definition into short-term memory. I require my students to learn at least seven new words a week; in this, Heinlein is very helpful, because he actually used a more sophisticated vocabulary in his juveniles than in his adult fiction. If teachers do not encourage students to acquire the new vocabulary, students often have a hard time with Heinlein's juveniles for precisely that reason: they are more difficult than today's more controlled, simplistic vocabulary in most young adult novels.

## CHAPTER ONE

Bill Lermer is with his Scout troop. We get one of the classic Heinlein moves when he has them flying back from their camp (Scouting is the familiar, the flying turns it into science fiction; the most famous of this great technique for inducing a "sense of wonder" is Heinlein's sentence, "The door dilated."). Bill is angry because he is stuck with a "twerp" for a co-pilot, who wants to fake an emergency for traffic control so they can go faster. Bill tries to send the twerp aft; he refuses. On the ground, Bill is about to start a fight with the twerp when Mr. Kinski the scouting master stops it. Bill is about to accuse him of insubordination when he realizes there were no witnesses.

On the way home, Bill hears the food ration has been cut another ten calories a day (letting us know that overpopulation and the dangers of starvation are themes of this book). We also learn about the starship *Mayflower* was now finished, and emigrants can apply.

Bill gets home; he calls his father by his first name, George (another difference from the present). Bill cooks dinner with the "quickthaw", which is probably a microwave oven (this would be the first mention in fiction of such a thing, as far as I am aware). Bill sets dinner the way Anne would have done (Bill's mother, now dead).

They eat, and talk about the rationing. Bill gets angry because the Chinese keep having so many babies. Clearly, there is some kind of world government (communism?), because George explains "Share and share alike, Bill." Bill tells his father about the scouting trip; he thinks he may have seen a mountain lion (which his father assumes are extinct). They talk about emigrating. Bill cleans up (his father isn't as thrifty as he is) and they play a game of cribbage. His father explains that he has decided to emigrate – alone. He doesn't want to take away Bill's chances here on Earth for an education. Bill gets hot under the collar; George reminds him of the Scout code of obedience and courtesy. Bill wants to go too. Bill argues that fathers and sons should stay together, as they did on the original *Mayflower*. His father tries to argue this is different; Bill points out that the danger was just as real then (half the colonists died that first winter). Bill then attacks his father for not wanting to be his partner (which is the relationship his father set up after Anne died), and just wanting to go eat more. Bill feels bad for playing dirty pool with his father.

Bill goes to shower and cool off, and to consider going to Ganymede. Bill's never even been to the Moon; one of the other scouts was born there. He gets up to find a book about Jupiter's moons. His father is still up; he tells Bill he isn't going to emigrate.

His father insists that they will remain partners: both will go, or both will stay, unless Bill chooses to go to school and join him later. Bill falls asleep dreaming of Ganymede.

He doesn't get a chance to talk to his father until he comes back from his class trip to Antarctica (!). He tells his father he will stay and go to school, if that's what he thinks is best. His father is pleased – then shows Bill the emigration application he filled out for his son two days ago.

## CHAPTER TWO:

Bill is getting excited, even though his father cautions him that they haven't been approved yet. Bill objects that going all the way to Ganymede “scares the sissies out.” (this is one of Heinlein's lifelong beliefs: emigration, especially going to the frontier, helps to raise the level of humanity). George cautions that they aren't supermen; Bill argues they need engineers, and that “we seem to have done a fair job in picking our grandparents.”

Bill's friend Duck Miller decides he wants to go too. He wants Bill to talk George into signing as Duck's sponsor. Bill asks his father; his father tells him to wait and see what happens. Duck comes back and tells Bill he's an idiot for going (more or less). Duck has a cushy life ahead of him in his father's businesses. Duck also insists it's impossible to live on Ganymede.

Bill and his father talk about their chances of survival. George is very clear that the colony might indeed fail, and points out that the first four colonies in California failed. He points out how technology allows them to survive in California, which is mostly desert. As his father says, “Wherever Man has mass and energy to work with and enough savvy to know how to manipulate them, he can create any environment he needs.”

Bill and his father have to pass a lot of tests. They do. They even arrange a test to push Bill to lose his temper. He gets angry, but he doesn't do anything about it, except to try to get the file they were using to ridicule him.

They get word they've been accepted, if there is need for them.

They have a huge feast.

Bill has his medical record tattooed on his butt.

They get orders to report. They are only allowed to take 57 pounds, so Bill has to give away most of what he owns. The only sticking point is Bill's accordion, which his father recommends listing as a cultural item, for special allowance. Bill goes and plays for the approval board, and succeeds (one RAH self-reference: Bill plays “The Green Hills of Earth”, a song from Heinlein's story of the same name).

George drops a bomb on Bill: he's getting married. Bill goes to his room and cries, out of grief over his mother. Mrs. Molly Kenyon, his father's fiancée, and her 12-year old daughter are coming over for dinner. Bill is cold; he isn't happy. Bill thinks he is doing it just so they can get to Ganymede; his father sets him straight. Bill accuses his father of not loving Anne, his mother, any more; George tells him he needs a good thrashing.

The next day, George apologizes, and tells Bill he still loves his mother, and always will. Bill apologizes too. George invites him to the wedding; Bill says he is too busy.

His father leaves on his short honeymoon.

### CHAPTER THREE:

Bill makes his own travel plans. All he has left is his Scout uniform – and he doesn't know what to do with it. Then he realizes he has lost some weight, and wonders if it's enough. It is, as long as he doesn't eat anything for the next day. He packs it, and travels to the space port. The hotel is overbooked, and packed to the gills. He's very hungry.

He goes through the boarding process. Duck shows up to say goodbye, and offers him a box of chocolate he can't take with them; his mouth waters at the idea of eating a piece. He gives in and has one. Duck tells him he is wishing he could go now.

Bill's father and new wife and daughter show up. Bill is sweating, and the customs inspectors question his scouting uniform. They allow it.

Bill is offered some spacesick medication; he refuses. He watches the *Daedalus* take off. An older woman (often referred to as the Heinlein matron, a stock character he uses often) complains that she wants breakfast before they take off, and the captain will just have to wait. Nothing doing. The matron tries to get out of her seat; her husband prevents her (we find out later her name is Mrs. Tarbutton).

Heinlein describes the takeoff beautifully – the pressure, the noise, the final entry into zero g. Given that this was written years before anybody had actually launched into space, it is remarkable how accurate Heinlein was.

### CHAPTER FOUR:

Bill doesn't like weightlessness.

Heinlein explains free fall perfectly: “we fell up”.

Mrs. Tarbutton loudly objects to free fall – she expects the captain to stop it.

Heinlein makes a funny comment, when he explains that spaceship ballistics is “grammar school physics”!

People vomit; Bill almost brings up the chocolate.

Bill takes the spacesick meds now. The nurse knocks out Mrs. Tarbutton.

Bill “flies” and crashes into things. He figures out how to move, and gets his first view of Earth from space (again a prescient forecast from Heinlein; indeed, watching the Earth became the best part of going into space).

Bill runs into the twerp, Hank Jones. Jones explains that he had to have the shot too. Jones pulls Bill along; he tries to go into the control room. Jones ignores the warning signs; he finagles their way into the room. Heinlein describes how you have to eat food in outer space – another correct prediction. The control room is described.

The captain asks if they're Eagle Scouts; they both are. He asks how old they were when they reached that point; Bill says he was thirteen when he got it, Hank claims 12 – and the captain claims 11. The captain tosses around some tall tale about pirates; Bill thinks to himself: “Adults always think anybody younger will swallow anything; I try not to disillusion them.”

Bill goes back to his family, and tells them he has been in the control room – nobody believes him, especially The Brat.

Turns out the captain is famous for having been taken pirates (his name is Captain DeLongPre).

They arrive at the *Mayflower* and board.

#### CHAPTER FIVE:

Spaceships smell bad – another correct Heinlein prediction.

Baths are scarce; clothes can't be burned – they have to be washed (another Heinlein sense of wonder moment).

They start accelerating; it is very, very gentle. Captain Harkness offers them lunch.

They tell the passengers not to move more than a few inches from their bunks without permission, as they have to keep the ship balanced in flight to arrive safely.

One boy named Noisy complains loudly and leaves; their food arrives while he is gone; when he comes back, there isn't any for him because he wasn't there to receive his share.

He goes off to complain; they return and strap him down.

They near the Moon. They go past. The captain starts spinning the ship to provide some artificial gravity.

Noisy complains about hanging from the wall.

Bill attends Captain's Mast, a court as a witness to what Noisy did. Noisy said he did it because he was hungry; the captain puts him on bread and water for ten days. A wealthy woman is condemned to wash dishes. The punishment fits the crime.

#### CHAPTER SIX:

Bill finds his father and stepmother; we find out his stepsister is named Peggy. Bill talks about the Captain's Mast; he decides he will obey.

They set up a government to run the colonists while aboard. The first decision: time for school!

The first thing the school does is take them on a tour of the ship.

Heinlein explains the torch ship's workings. Their tour guide is named Ortega (in *Tunnel in the Sky* and elsewhere, the inventor of the torch ship is named Ortega).

We get a history of the development of the rocket (Heinlein predicts a four-stager to the moon; this was the common thinking in the early fifties among moon enthusiasts).

Heinlein explains why you can't go faster than light, and Einstein's energy/mass equation.

Noisy asks what would happen if they needed to make a repair; Ortega says there is no need, as there are no moving parts. Bill's father says it's possible, but if it happened, whoever went would die.

#### CHAPTER SEVEN:

Space travel is boring, since there is little to do but eat and sleep. School helped. Adults who knew something taught it; the kids asked questions. Bill plays cribbage with his dad, then he teaches his stepmom and stepsister how to play.

He and Hank decide to start Scouting on the ship for something to do. They hold the first meeting and form the troop. They come up with names.

They also set up Girl Scouts.

#### CHAPTER EIGHT:

They're finally able to see Jupiter. Heinlein explains space navigation.

They have an accident, when they are hit by a meteorite. There's a fist-sized hole near Bill's feet. He uses his uniform to plug the hole, then they see the door to their compartment slide shut for safety. Noisy freaks out. They put a pillow over the hole. Somebody hits Noisy to knock him out. The crew come and patch the hole.

They give Bill a Captain's Mast and thank him for his fast thinking. The captain tells him "luck comes to the man who is prepared for it." Peggy tells everybody Bill is her brother; he likes it.

Ortega gives Bill the meteorite.

Noisy confronts him and hits him. Three times. Basically, Bill decides, some people are just no good.

#### CHAPTER NINE:

A four year old is missing.

The Scouts search for him. They find him in the hydroponics area, which the kid has messed up

Bill starts to think some of the colonists shouldn't be there, as they aren't fit; his father explains about political influence. Bill is shocked.

They pass over the north pole of Jupiter, approaching Ganymede.

They've been terraforming Ganymede, giving it a livable atmosphere.

Bill works unloading cargo as he waits his turn to go down to the surface in the *Jitterbug*. When they get out, it's cold, the atmosphere is barely tolerable, and everybody is miserable. They reach shelter, but Bill and George get picked to go back out and bring in the luggage with some other men.

They get separated from the women.

The colonials make fun of them.

#### CHAPTER TEN:

George isn't happy about not being with his wife and stepdaughter, but the town has no facilities for families. They have to separate the genders.

All complaints have to be routed back to Earth!

Bill doesn't care – they have plenty to EAT!

Bill helps. He discovers that anything from Earth is very, very expensive; the only thing cheap on Ganymede is food.

Bill loves looking at Jupiter, in all phases.

He also explains all the moons, and the lighting.

You can't get sunburned on Ganymede.

## CHAPTER ELEVEN:

George gets a job as an engineer, but that means he won't have enough time to farm. There are homesteaders and townies. The company will feed a colonist for a year while he gets his farm going, then he has to pay it all back, to own his farm and home. The reality is about six times as many colonists than they could handle were dumped on them (by the way, this happened in Virginia in the early 1600s). They do the best they can to handle the newcomers; food isn't a problem – living space is. The problem is, they don't need farmers; they need manufacturers. It will be three years before they can process any new soil for farmers. The newcomers feel they've been swindled.

They also offer them the chance to work as farm hands, which one newcomer calls sharecropping. Basically, they can work or starve (they will feed the children).

Basically, they've been lied to.

## CHAPTER TWELVE:

The immigration official resigns rather than have to deal with all the complaints.

They're going to send back anybody who doesn't want to stay.

Bill and his family hold a meeting to discuss their decision. Peggy is having health problems, but George thinks he can rig something so she can get out of the hospital.

Bill finds the Scout troop on Ganymede that already exists. Bill meets a scout, named Sergei. They figure out how to combine the troops.

Heinlein explains what ecology is (for most readers in the fifties, this would have been the first they'd heard of it). Nobody hurts insects on Ganymede, especially earthworms. Heinlein explains how they make atmosphere.

Heinlein also explains the dangers of an animal that doesn't fit into its environment.

Bill offers to make the family a farm, while George works and Peggy gets better.

## CHAPTER THIRTEEN:

Bill and his father go out to see their land they've been given. Bill offers to someday grow some tobacco; George says he doesn't need it. Their land is covered in a lava flow and a boulder field. His father calls the place Golgotha (where Christ was crucified). They talk about Bill going back home; he refuses.

A neighbor, Mr. Schmidt, approaches, yodeling. Bill recognizes him from Scout meetings. Mr. Schultz invites them back to the house for a meal. Mr. Schultz has the only tree on the entire moon: an apple tree. They meet the Schultzes, with their five kids. Mr. Schultz gives Bill the 8 apple seeds from an apple. Since they won't have access to a rock crusher for several months, Mr. Schultz offers Bill a job as farmhand.

## CHAPTER FOURTEEN:

Mr. Schultz really doesn't need a farmhand; he is just trying to help Bill out. Bill learns how to be a farmer. The problem is technology is expensive, so everything has to

be done by hand, by “stoop labor”; of course, with Ganymede’s low gravity, that isn’t as much trouble as it would be on Earth. Bill brings his accordion out to play for the family. He teases Gretchen, one of the daughters, for having fire for hair (Ginny, Heinlein’s wife, had red hair too).

Finally, Bill and his father get their turn with the rock chewers on their land. They use lots of homemade nitroglycerin. Bill is almost killed by one explosion.

Saunders, a professional complainer, comes to visit, and borrows explosive from them. He wants the rock chewing to be done by crews, paid for by the government. Never mind that there aren’t enough trained men for that. Then he wants millions of tons of Earth soil sent to Ganymede (never mind the cost).

George gets Saunders to leave by suggesting they’re about to blow up a big charge. George figures out how impossible Saunders’ request would be: “Why is it that some apparently-grown men never learn to do simple arithmetic?”

The rock chewer shows up, and begins by making them a road. They make Bill a five-acre farm. Bill then uses the “Cud-chewer” to break up the rocks even finer. His father, Hank, and the Schultzes help to finish the job over the next week. Mr. Schultz recommends planting grass to keep his “pay dirt” locked into the soil. Bill explains the process of making pay dirt; they work on keeping it sterile, so as not to introduce any unwanted organism into Ganymede’s ecology. Papa Schultz and his family bring six wheelbarrows of compost. They help to work it into the soil.

Bill starts sowing grass. Saunders shows up to make fun of him, and tell him he’s selling his land and heading back to Earth. Bill gets mad when Saunders ridicules Mr. Schultz as Johnny Appleseed.

Building a house was hard, due to the constant small quakes. Bill describes building his house, which has to have a pressurized room for Peggy.

The Scouts help him build it.

Bill still plans on paying Noisy back.

The Schultzes feed everybody building the house.

## CHAPTER FIFTEEN:

Bill doesn’t get that Gretchen likes him.

Bill stores ice for the summer.

The family moves in; they’re happy. Peggy has to stay inside a pressure bubble, but at least she can go outside with them.

They get their farm animals.

They make a fish pond.

Bill grows his crops.

Someday, they hope to have bees, but the scientists have to breed a special kind of bee, to fly in this low pressure. Right now, they have to pollinate by hand.

Peggy is the problem; she isn’t adjusting, and the whole family is feeling the strain.

Bill plays “The Green Hills of Earth”, and feels terribly homesick; he wonders why they ever came.

## CHAPTER SIXTEEN:

Spring comes; they feel better.

Bill has six apple trees growing inside, ready to transplant outdoors.

They talk about adding a window, for the view.

George has decided to quit working in town, except to teach Saturdays, because he likes it.

The moons line up with Jupiter and the Earth; beautiful, but a terrible quake hits.

Peggy is almost killed by explosive decompression.

The heat trap that keeps Ganymede warm is knocked out, because the power transmitter is knocked out. Everybody is going to freeze.

.They trek back to town, almost getting lost, trying to keep the cow and each other alive.

A rock crusher comes along, but they have to leave the cow behind. George slits its throat.

#### CHAPTER SEVENTEEN:

They make it to town, and get Peggy into the hospital. George goes to help with the power station. Bill realizes he's back where he started on Ganymede.

They survive almost freezing.

Bill finally makes it to the hospital to check on Peggy. Molly's arm is broken.

Bill and Hank help look for survivors; there seem to be none. They find one couple frozen solid as rock.

More than 24,000 people died in the quake. All the crops are gone; most of the livestock is gone.

They go to the Schultzes' farm. The apple tree is gone, but the Schultzes are alive! They stayed alive by burning the tree to stay warm.

They kept their livestock alive as well.

Bill goes back to his farm; the house is knocked down.

Bill thinks he's done. He's ready to go back to Earth. They gather their belongings and go back to town.

They make plans to build two more power plants, so this will never happen again. They won't starve, but times are going to be hard. Bill doesn't care; he and his family plan to go back to Earth as soon as possible.

Bill helps rebuild while they are waiting.

Saunders and Noisy plan to go back too; Bill starts to change his mind about leaving, because of the company.

George wants to stay, but he must think of Peggy first.

But Peggy dies, so they stay.

Bill cries, and blames himself for her being there. He calls to his mother, whose spirit appears and comforts him.

#### CHAPTER EIGHTEEN:

They rebuild their house, and quakeproof it.

Two years later, the colony is thriving.

The colony has bees now, and horses. Molly and George have twins.  
Bill helps bring back the Boy Scouts.

Bill thinks about going back to Earth, to get his education; George has blocked funds there that would pay for it. Instead, Bill goes along as cook on the planetary survey.

Paul du Maurier leads the survey. They do the survey, and speculate on things like the possibility of life on other planets. Paul also explains why they won't ever get swamped by emigration from Earth; the pool of emigrants is too small.

Also, Paul predicts that sooner or later, Earth will explode in war, and they will be isolated for a time. Paul intends to stay on Ganymede to avoid it: "I'm not raising my kids to be radioactive dust."

#### CHAPTER NINETEEN:

They find an excellent site for a settlement; they call it Happy Valley.

They discover that Earth life is spreading on its own over the planet.

Hank and Bill go exploring, and find the crystals.

They find creatures in the crystal.

They have a hard time getting back; Bill's appendix may be about to burst.

They use a piece of the alien technology as a bridge to get out.

It turns out to be mobile.

They try to get back to camp, and find Sergei; the *Jitterbug* had to leave.

They use the walker to get back home.

Bill has a burst appendix.

#### CHAPTER TWENTY:

Bill suggests the aliens are "men."

Bill worries about the war coming on Earth, and if there will be one on Ganymede someday. Paul hopes they've learned enough by then to avoid it.

Bill thinks about going to Callisto; his father talks him into going back to Earth for his degree.

Then he thinks again – he'd get his Eagle Scout finished, then teach himself.

Bill realizes he's home, and home to stay.

#### **Chapter Tests / Quizzes:**

Personally, I do not care for many published textbook tests/quizzes, as I often find them to not fit what we have actually discussed in class, or what the students have themselves found in the text. I therefore tend to make up my own quizzes and tests, and I also rely heavily on questions about relationships, more than I do questions about specific details of the books. I teach very poor readers, and I am far more concerned that they understand what is happening between the characters, than I am in what color shirt a particular character is wearing, or some other pithy little detail that teachers dealing with very good readers might ask to make sure that their students have read. I check to make sure they've read by insisting that they answer the following kinds of questions using

specific details (and by always asking a question about the end of the chapter), but I allow them to choose the details themselves to fit the question. I train them to answer questions this way by giving them several sample questions, then answering them on the board, using their input to craft a model response. I hope that the following questions are useful for quizzes and tests, as well as for classroom discussion. Again, I expect students to use specific details from the novel to answer these questions. If the extra credit questions seem appropriate for your class, you can add them to the quizzes, or use them as extra credit homework assignments.

#### CHAPTER ONE:

1. What problems are happening on the Earth? How is the population coping with those problems?
2. What is different about scouting and high school field trips in this future?
3. Where does his father decide he wants to go? What argument emerges from that decision? How is that argument resolved?
4. Describe the relationship between Bill and his father; how is it different from today's father-son relationships? Include what happened to the mother in your answer.

#### CHAPTER TWO:

1. What happens with Duck?
2. What is the testing like?
3. Where does Bill get his tattoo?
4. What does Bill decide to take with him? How does he get permission?
5. What surprise does his father spring on Bill? How does Bill feel about it?

#### CHAPTER THREE:

1. What does Bill decide at the last minute to take with him? How does he manage it?
2. Who comes to see him off? What gift does he bring?
3. What is the boarding process like?
4. What is the takeoff like?

#### CHAPTER FOUR:

1. What is free fall like?
2. Who does Bill meet on board, to his initial distaste?
3. How do they get into the control room?
4. What tall tale does the captain tell them?
5. What does Bill find out about that supposed tall tale?
6. Where do they get to at the end of the chapter?

#### CHAPTER FIVE:

1. What is acceleration on the *Mayflower* like?
2. What happens to Noisy?
3. What is the effect of spinning the ship?
4. Explain what happens at the Captain's Mast.

#### CHAPTER SIX:

1. What do they set up to run the ship?
2. What is their first decision?
3. Explain what Bill learns about space flight.
4. What would happen if there needed to be repairs on the torch during flight?

#### CHAPTER SEVEN:

1. What is the worst part of space travel?
2. What does Bill teach his stepmother and stepsister?
3. What do they set up to pass the time?

#### CHAPTER EIGHT:

1. What accident happens?
2. How does Bill respond to it?

3. How does Noisy respond to it?
4. What happens at the next Captain's Mast?
5. What does Noisy do later?

#### CHAPTER NINE:

1. Who gets lost?
2. How do they find him?
3. What is the *Jitterbug*?
4. What is it like on Ganymede?

#### CHAPTER TEN:

1. What is George's complaint?
2. What is their answer?
3. What is the only cheap thing on Ganymede?
4. Describe Jupiter from Ganymede.
5. Why can't you get sunburned on Ganymede?

#### CHAPTER ELEVEN:

1. Describe the problems that they discover when they get to Ganymede.
2. What options are the newcomers given?

#### CHAPTER TWELVE:

1. What scouting problems occur?
2. What ecological problems exist in Ganymede?
3. What does Bill offer to do for his family?

#### CHAPTER THIRTEEN:

1. Describe their 'farm':

2. Who comes to visit them?
3. What does he have that nobody else on the planet has?
4. What does he give Bill?
5. What does he offer to Bill?

#### CHAPTER FOURTEEN:

1. What does Bill learn from Mr. Schultz?
2. What is wrong with Saunders' ideas?
3. How do you turn rock into soil? Explain the process thoroughly.
4. How does Bill get a house?

#### CHAPTER FIFTEEN:

1. Describe the progress of the farm.
2. Describe Peggy's continuing problem.
3. What emotional issues is Bill having?

#### CHAPTER SIXTEEN:

1. What astronomical event occurs?
2. What effects does it have?
3. What almost happens to Peggy?
4. What happens to the cow?

#### CHAPTER SEVENTEEN:

1. What happens to the apple tree?
2. What happens to Peggy?
3. What does Bill plan to do? Why does he change his mind?
4. What happens at the end of the chapter?

CHAPTER EIGHTEEN:

1. How has the colony changed after two years?
2. What is Bill considering doing back on Earth?
3. What does he join instead?
4. Why do they not need to worry about too many emigrants?
5. What does Paul predict will eventually happen on Earth?

CHAPTER NINETEEN:

1. What is Happy Valley?
2. What discovery do they make?
3. How do they escape?
4. What's wrong with Bill?

CHAPTER TWENTY:

1. What decision does Bill make about his life?

**Extra Credit Questions:**

1. Explain the origins and meanings of the spaceship names: *Bifrost*, *Daedalus*, *Icarus*, *Mayflower*.
2. Why does Bill's father call their land "Golgotha"?

**Vocabulary Words** (these are all words I've had students ask me about):

- p. 8: insubordination; muster; emigrants
- p. 10: commissary
- p. 21: perilous
- p. 22: hemorrhaging
- p. 24: smirk; galoots
- p. 34: squalling
- p. 43: stanchion
- p. 51: airfoils
- p. 52: spherical; conical
- p. 55: impromptu

p. 83: agoraphobe  
p. 87: hydroponics  
p. 88: contrariwise  
p. 101: commissary  
p. 109: vexed  
p. 144: loam  
p. 187: initiate; synthetic; resin  
p. 190: insufferable

### **Essay Questions and Projects:**

1. Research Malthus' arguments about overpopulation, as well as the arguments that have been advanced to prove them wrong. Using Heinlein's novel as one of the arguments supporting Malthus, write an argumentative essay laying out the pros and cons of Malthus' ideas, and conclude with your own opinion on the subject.
2. Research our current knowledge of Ganymede. What do we now know about this moon? Present your findings, complete with a selection of the pictures available.
3. Write an argumentative essay concerning Heinlein's idea that emigrating, especially long distances, "scares the sissies out." What are the effects of immigration on those who move? Do the brave and the talented move more? Does immigration benefit the country or place that the immigrants go to? Use examples from American history and/or personal family history to support your argument.
4. Research how hydroponics works. Set up a small sample, grow it, then enter it in your next science fair, or as a project in your biology or life science classes.
5. Research the dangers of importing animals to an environment where they have no natural predators. The Australian jackrabbit is mentioned. Explore the biggest issues we have with these today, and what is being done to cope with them.
6. Research the process of turning barren rock into fertile soil, focusing on the steps Heinlein outlines in the novel. Set up a demonstration project (Ginny Heinlein did all this, to prove it would work).
7. What are the disadvantages of using food for fuel? Research the economic and environmental impacts of fuels like ethanol.