

# **The Martian Study Guide**

## **The Martian by Andy Weir**

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## Plot Summary

“The Martian” by Andy Weir is the story of Mark Watney who is a crew member of the Ares 3 mission to Mars. The crew had traveled the nearly year-long journey from Earth’s orbit to Mar’s orbit on the Hermes and had used the Mars descent vehicle (MDV) to land on the planet’s surface. Earlier pre-supply drops at the Ares 3 site had provided the crew in advance of their arrival with essential items for their health and well-being as well as equipment to conduct their duties, experiments and research. The Hab, the living quarters for the crew, was one of the items that was dropped earlier as well as the MAV (Mars ascent vehicle) which would enable them to return to the orbiting Hermes for their journey home.

As the title of the crew indicates, Ares 3 was the third mission to Mars in the NASA series. The two earlier missions had been successful and did not experience any major problems. Confidence was robust at NASA and within the Ares 3 crew that their mission would follow their predecessors in its success in advancing space travel and learning more about Mars. However, Ares 3 did not at all go by script.

After the astronauts had erected the Hab and created a safe environment within it, they faced a vicious and unrelenting sandstorm. Visibility was zero on the planet and NASA feared that this storm, like many on Mars, could literally last months. NASA deemed the storm dangerous and life-threatening for the astronauts and scrubbed the mission. The astronauts were to board the MAV and return to the Hermes for their flight home.

As the astronauts were heading to the MAV, the storm raged even more ferociously. As Mark stumbled toward the MAV as best he could, an antenna dislodged from the Hab and struck him with full force. It knocked him down and he soon lost consciousness. The other crew members made it to the MAV and the headcount was five instead of six. Houston, they had a problem.

The astronauts’ spacesuits are equipped with monitors that send vital sign stats to the other astronauts. There were no signs of vitality reported from Mark’s suit. He was dead. The commander tried in vain to find Mark’s body. It was impossible given the wind and sand to see more than a few inches in front of her face and she had to give up her search. The MAV was revved up and ready to ascend to their rendezvous with Hermes. They had to leave their dead colleague behind.

But Mark woke up. He wasn’t dead but he was abandoned. When he saw that the MAV was gone, he knew that he had the challenge of his life ahead of him. Failure to meet that challenge meant certain death. In remote imagery from the Ares 3 site on Mars, NASA noticed that things were moving. The rover vehicle was parked in one spot one day and in another the next. It meant only one thing – Mark Watney was alive.

The challenge to keep Mark alive was suddenly not just his alone. NASA put one-hundred percent of their efforts on figuring out a way to rescue Mark or at least keep him alive until Ares 4 arrived four years later. There was never a consideration of the



billions of dollars that it was taking to rescue this lone astronaut. There wasn't enough food and there were dangers of air leaks in the Hab that was meant to last a month that could take his life while he slept. The whole world watched and waited and rooted for the brave astronaut to be saved.

The challenges, disappointments, frustrations and near-death experiences that Mark faced during the more than eighteen months he lived on Mars and during the risky rescue attempt had never before been imagined. NASA and the Ares 3 crew were dedicated to Mark's rescue and did everything within their powers and abilities to save their fellow space traveler. But it was Mark's hard work and refusal to give up that proved to be most crucial.

Mark Watney made space exploration history and not in any way he would have ever chosen.



# Chapters 1 through 3

## Summary

Mark keeps a daily log Mars. He's not sure who'll read it. Perhaps someone in 100 years. His crew thought he died. He didn't, but he would die on Mars. The Ares 1 crew returned to earth as heroes as did Area 2. On Ares 3, Mark was a lowly crew member under Commander Lewis but now is in command because everyone else is gone. The rest of the crew probably got back to earth. Mark holds no bitterness toward them. He would have done the same thing.

Ares ships get into an Earth orbit then board the Hermes to Mars. Hermes is powered by ion engines which allows for an accelerated trip. Ares 3 made it to Mars in 124 days. They used the Mars descent vehicle (MDV) to get to the surface. The living quarters is called the Hab which is stocked with everything the crews need. The most important piece of equipment is the Mars ascent vehicle (MAV) which is what the crews use to return to their ships.

When Ares 3 landed, they had to deal with high winds of 175 kph. The MAV was taking a beating so Houston instructed the crew to return to their ship. Everyone made it to the MAV except Mark. He had been impaled by a large antenna that had collapsed from the wind. He was in serious pain and had the wind knocked out of him. He saw Johanssen reaching out toward him then blacked out. He woke when his space suit generated a low oxygen alert. He was bleeding from his wound. The loss of pressure in his suit from the hole was equalized by air from his nitrogen tank. But CO<sub>2</sub> was beginning to build up and depleting the nitrogen. He was able to mend the hole to regulate his pressure. But he had to get to the Hab to avoid oxygen toxicity. On the way to the Hab he discovered that the MAV was gone.

Communications are down in the Hab. He had been struck by the collapsed antenna. There is no way he can contact Hermes. Crew members have access to each other's space suit stats. They undoubtedly had seen that his pressure had dropped to nearly zero and figured he did not survive. The dead bodies of crew members stay on Mars. Mark had been abandoned on Mars with no way to communicate and supplies that would run out in a year. He would die on Mars.

There is enough food for one person for at least a year. He plans to fix the antenna so he can communicate. Electricity powered by the sun is obtained through solar cells. There are also medical supplies, which he needs to treat his injury. His specialties are botany and mechanical engineering. Ares 4 is scheduled for a mission but won't arrive for four years. His first priority is to set up a line of communications.

Mark takes a Rover to hunt for the antenna but can't find it. As the crew's botanist, Mark brought planting seeds with him along with a small amount of earth; his fertilizer was vacuum-dried human waste. He will plant peas and green beans from the food supply in



the Hab. Using a combination of Earth soil and Mars soil, he develops a mixture that is ready for planting. Creating his garden on the Hab floor is backbreaking work. He figures out how to save on water so he'll have enough for his plants. He thinks of his family in Chicago. It's Thanksgiving Day. He wondered if they'll ever find out what happened to him. He will focus on planting potatoes which are high in protein and calories. Still, his calculations tell him that he'll be about a year short on food.

Mark needs 1,500 calories a day and food that will last 1,425 days until Ares 4 arrives. There's a good amount of protein in the food packs and he has a large supply of multivitamins. He has only twelve potatoes which he cuts into quarters and plants. It will take about forty days to have new potatoes. His entertainment is TV shows and movies from Commander Lewis's data-stick. He sets up the pop-tents from the two Rovers to expand his planting capacity. He'll gladly sacrifice some air each time he exits to tend to the tents for the extra food.

Mark has to have water for the plants. His was a dangerous plan to create more water – combine oxygen and hydrogen and burn it. There is some oxygen on Mars although it is 95 percent CO<sub>2</sub>. The landing gear, ramp and fuel plant from the MAV are still there. He sets up an oxygen capturing system in MAV's left-behind fuel plant. Luckily the crew had left behind a huge supply of fuel, hydrazine from which he can extract water but the process is dangerous.

## Analysis

Mark Watney has been abandoned on Mars and has no obvious way of leaving the planet. Mark symbolizes the fundamental solitary existence of man; just how alone human beings really are. Man comes into the world alone and he goes out of the world alone. Despite others in our lives, we are alone. Mark Watney and his tragic abandonment epitomizes this fundamental truth about humankind.

Many people could not face up to the challenge that Mark faced when he realizes that his crew had abandoned him. There was no bitterness and he would have done the same thing. He has a grasp of what it means to be alone. It is a hyperbolic symbol of what all of mankind must contend with.

While Mark faces the truth and dire situation he is in, his training as an astronaut has made him resourceful and dedicated to success. Dying on Mars would not be a symbol of success and it would not bode well for the legacy of NASA's mars missions. Although he figures he's being hailed as hero, and to Mark a hero survives. If he fails to meet the challenges and survive, he will see himself not as an important figure in interplanetary travel but rather a symbol of defeat.

Mark has become Adam – the first man in a new world. He's a botanist by trade and even plants a garden of potato plants that will help sustain him. But just like the original Garden, Mark's "garden" is rife with danger and temptation. Mark draws from his training and deals with the danger as best he can. As far as the temptation, Mark does



not cave to the easy way out – to give up and take a lethal shot of morphine for certain escape.

## **Discussion Question 1**

How was Mark Watney injured when the Ares 3 was rushing to the MAV for take-off? Why did the crew leave him behind?

## **Discussion Question 2**

What calculations does Mark make about his food? What food was provided to the crew and what plan does he have for supplementing his food supply?

## **Discussion Question 3**

What does Mark need more than drinking water for himself? What is Mark's unusual plan to make more water? Why is it dangerous?

## **Vocabulary**

ion, argon, reactant, sandblasted, copious, toxicity, tertiary, redundancy, prolifically, annihilates ingress



# Chapters 4 through 6

## Summary

Mark can create water but not very quickly. Storing the hydrogen is also a problem. Dealing with these elements is dangerous and an explosion could erupt at any time. He has to set the hydrogen on fire to make water. Mark splits apart a wooden cross that Martinez had brought on the mission. He catches the hydrazine on fire and to his delight, the process works – he created water. Due to a reserve tank of oxygen he later realizes that he isn't making as much water as he thought and that hydrogen is building up. He is creating a bomb. He puts a space suit on and waits for the explosion in the Rover.

Mark figures out how to solve the hydrogen problem. He rigs the oxygenator to extract oxygen from the hydrogen. Hydrogen without oxygen is harmless. He has to worry about destroying the soil so he decides that lowering the temperature will put the soil in a state of near hibernation which will keep it from spoiling. He cautiously reenters the Hab and lowers the temperature to 1 degree Celsius. The regulator isn't pulling enough oxygen out of the air so Mark uses wires from a LED flashlight to create a spark allowing him to clean out the hydrogen and make more water. Everything is great until the explosion.

The explosion throws Mark across the room and leaves the Hab in a mess. The regulator is reactivated by the low oxygen alarm and infuses pure oxygen into the Hab. Mark's clothes are burned especially on the arms. He's not sure what caused the explosion. He stays the night in the Rover.

Mark runs a series of tests the next day in an attempt to find the problem. He figures out where the extra oxygen in the air came from. Even though he had a mask on it wasn't tight fitting and the extra oxygen came from him exhaling. With all his efforts, he had made only 130 liters of water and had 470 to go.

Venkat Kapoor, the director of Mars operations, walks into his office and sees that he had 47 emails that needed his attention. He'll forego them until the next day. Today is the memorial for Mark Watney. The President had proclaimed Mark a hero. Commander Lewis and the Ares 3 crew gave eulogies for Mark from the Hermes. It would be ten months before they arrived home.

Mindy Park, a NASA mechanical engineer, is in charge of monitoring images from the Mars satellites. A new image flickers across her screen. A series of shots of Ares 3 is coming through for Dr. Kapoor. Kapoor will be happy; the Hab looks to be in perfect shape. Suddenly she is stunned by something on the screen. She makes an emergency call to Venk Kapoor. He needs to come right in to the lab. He is annoyed that she called him in the middle of the night. Mindy shows Venk the pop-up tents and the recently





dusted off solar cells. It finally dawns on Venk what Mindy is trying to tell him. “Oh, God,” he says.

Annie Montrose is upset at the prospect of facing the media with the news. Venk tells Ted that he’s nearly one hundred percent positive. Ted thinks his body is probably buried in the sand. In addition to the evidence that Mindy provided, one of the images shows that the Rovers were moved since the crew left. The remaining parts of the MAV have been taken apart. Sanders doesn’t want the Ares 3 crew told. They’re stressed already; he doesn’t want them upset for leaving their colleague behind.

Teddy heads for Chicago to tell his parents before the news leaks out. He doesn’t look forward to the conversation he has to have with them. Venk visits the communications department and learns that Mark has no communication at all. NASA communications experts can’t figure out a way to contact Mark because there is no satellite disk. The primary communications system was wiped out in the wind storm; the three back-up systems were in the MAV. Annie holds a press conference and announces that Mark is still alive. After a moment of stunned silence there is chaos. Teddy announces that NASA’s full focus is on rescuing Mark.

Venk tells Teddy that Ares 4 can land at the Ares 3 site and take off in full burn to the Ares 4 site where they will have a MAV that will return them to Hermes. They will have to take the risky step of making the craft lighter by losing emergency and safety equipment. Teddy is not thrilled with the prospect of putting more astronauts at risk. Venk and his team will work on the plan and on keeping Mark alive for four years.

## Analysis

The demons of failure, hopelessness and dismay at impossible odds haunt Mark in his early days of solitude. He’s the man in a strange new world where the rules are different. He’s alone and initially cannot communicate with another soul. He has been thrown into a hostile world which he must learn to live in or be defeated by it. He is like a baby. He knows some things by instinct but other challenges represent first steps for him.

The author creates a complex story that involves others who also enter Mark’s brave new world. His associates have personal stakes in Mark’s rescue and put all their efforts in devising a way to save him and recover their own standing. While the rescue is ostensibly focused on Mark and his survival, there are deeper things at work among those involved in his rescue and survival. Man’s triumph depends upon more than what is visible on a physical level.

Venk Kapoor is the director of the Mars missions and is torn apart by Mark’s abandonment. While he undoubtedly cares for Mark and mourns his loss, there is another element to his misery. Venk is the director of the mission. His legacy is at stake. Although he could not have prevented the incident that left Mark alone on Mars, Venk is in charge of the mission and where he sits is where the buck stops. When it is revealed



that Mark did survive the incident and is alive, Venk is given the chance to not only save Mark but salvage his own prestige and stature.

The Ares 3 crew is dedicated to one another, a reality that is a natural evolution among people working closely together for one mission. They do not abandon each other. They do not leave a fellow astronaut behind. When the crew has the chance to return on a risky trek to try to rescue Mark, they do not hesitate. They want to save Mark and want to escape the taint of being the crew who left one of their colleagues behind.

While the abandonment of Mark symbolizes the aloneness of man, his recovery represents redemption and new hope.

## **Discussion Question 1**

Describe the process that Mark devises to make more water. What goes wrong with his plans?

## **Discussion Question 2**

What is Mindy Park's title at NASA and what is she responsible for? What surprises her about the images she sees from Ares 3? What does she discover about Mark Watney?

## **Discussion Question 3**

Why doesn't Teddy want the Ares 3 crew told that Mark is still alive? Why does Teddy dread telling Mark's parents that he's still alive?

## **Vocabulary**

exothermic, fluctuation, empirical, probes, satellites, swaggering, simultaneously



# Chapters 7 through 9

## Summary

Mark needs to get to Ares 4 which is 3,200 km away. The MAV is already there because MAVs are sent ahead so there is time for the fuel build-up ahead of the crew's arrival. His only way to get there is on a rover which isn't built for long journeys. It's freezing on Mars so heating will be a problem. Mark names his experimental rover missions "Sirius." In Sirius 1 he starts out with fully charged batteries and solar cells on the roof. He finds that it's too cold without the heater which drains too much energy. Sirius 1 is a failure. Mark straps the battery from Rover 1 onto Rover 2 for extra power and successfully test drives it. He dubs it Sirius 2 and a success. He removes some of the solar cells from their lattice and stacks them on the roof of the rover.

For more heat, Mark plans to use the RTG (radioisotope thermoelectric generator) which is a large box of plutonium. He recalled that Lewis had Vogel bury the device four kilometers away and marked it with a green flag. Mark finds the RTG right away. He sets out on Sirius 3 driving laps around the Hab in the roughest terrain he can find. The RTG proves adequate heat and cuts an hour off recharge time.

The rovers are designed to have enough oxygen for three people for two days. Therefore, it will be enough for Mark for seven days which is not enough. He attaches one of the Hab's 25 liter liquid oxygen tanks to the rover which will give him enough oxygen for 49 days. He plans Sirius 4, a twenty-day test run. Ultimately it will take him 40 days to get to Ares 4.

Venk appears on CNN and tells the host that satellite images show that Mark is preparing Rover 2 for a probable run to Ares 4. It's a risk because there are no supplies there but he would have a communications system and could contact them. JPL is looking at modifications to Ares 3's MDV so it could make an overland flight.

At a meeting with NASA and JPL reps, Venk reports that Mark is still alive and had dug up the RTG to heat the rover. The plutonium is not a danger unless the pellets crack – then he's a dead man. Bruce Ng from JPL reports that they have a plan to lighten the MDV since they don't have enough time to design a new engine. Mitch Henderson, the flight director for Ares 3, wants to tell the crew but Teddy overrides him. They'll tell the crew once they have a solid rescue plan.

Venk reports that Mark will have enough food for three years. They could land an Ares 4 pre-supply at Ares 3. Once it's launched it will take eight months to get there. Bruce says that the pre-supply launch won't be ready for launch for six months. Teddy tells him to speed it up whatever it takes. Mark will starve to death if they don't.

A psychologist who tested the astronauts for Ares program suitability appears on a TV program and tells the host that she found Mark to be very intelligent and personable.



She hints that he may be traveling to Ares 4 because of the morphine supply which is enough to be lethal. Venk and Mindy figure out that Mark is driving to Pathfinder, a probe that was abandoned on Mars years before. Venk thinks they can get it online and reestablish communications with it. He calls Bruce and tells him to gather everyone who worked on Pathfinder. Venk is flying out immediately to meet with them.

Mark makes it to Pathfinder and sets up the solar panels for recharging. He is aware of the historic venture he's on – every step he takes is the first human step ever taken there. He's also the first long-distance driver on Mars. When their MDA landed, he'd actually been the seventeenth person to set foot on Mars. He's also the first person to be alone on a planet.

Mark plans to take both components of Pathfinder back with him – the lander itself and the Sojourner rover. The Sojourner fits into the rover. If he is able to establish a link with NASA he can hold up a message to the lander's camera. How they will communicate back is another matter. He sets up a ramp and after hours of exhausting labor he pulls the lander onto rover's roof. He plans to head "home" the next day.

## Analysis

The question of suicide is more than hinted at in this section which brings to the forefront an analysis of Mark's basic character and his ability to withstand extreme stress and a challenge with very low odds of success. The psychologist who had assessed the Ares 3 crew recalled Mark as being personable and able to crack jokes when he was stressed or fatigued. The author plants the seed of an idea that Mark may have an ulterior motive for traveling to Ares 4. He is ostensibly going to Ares 4 to be rescued. His good nature may be shielding more nefarious thoughts and plans. The author presents the possibility of suicide through the character of the counselor. She suggests that his good-humor and willingness to go along with a plan that is iffy at best may actually in his mindset be his last act. If suicide is on his mind, why does he drive 3,200 km to see it through? He wants to travel to the MAV and use its communication system so that he can talk one last time to a human. Mark is well aware that there is a new supply of morphine in the MAV and one that is large enough to be lethal.

Although Mark has shown no sign of wanting to end his life, being at the MAV that is stocked with the morphine that could take his life could be part of his plan. If the rescue doesn't go off, he has a way out – a sure way to leave Mars.

The reader has to wonder why the author decided to throw a left curve into a story that while not predictable is one that is following a logical course and one that the reader can picture a man like Mark following. If suicide later becomes a possibility or reality, then it is obvious that the author was using foreshadowing to plant the seed. If suicide is not at all a consideration, then the author was creating a red herring to throw off readers who think they had it all figured out.



## Discussion Question 1

What is a MAV and what is a MDV? What is a RTG and why does Mark want to retrieve the RTG that the crew left behind? What was it buried?

## Discussion Question 2

What did the psychologist who tested the Ares 3 crew have to say about Mark and his ability to survive? Why does she mention that the medical supplies includes a large dose of morphine?

## Discussion Question 3

What historic significance does Mark recognize about his situation? What is the Pathfinder and Sojourner and why was it important that Mark found them?

## Vocabulary

proactive, blight, plutonium, isotope, radioactive, deftly, orbital, trajectories, commemorative, discernible, centrifuge



# Chapters 10 through 12

## Summary

Mark follows his tracks back to the Hab. On the third day of his return, Mark gets a signal from the Hab and knows he's just a day away. He is jubilant that his trek to the Pathfinder and back was a success. It will be twice as far to Ares 4. He checks the air levels and fires up the oxygenator and atmospheric regulator. Everything is back to "normal." He'd been gone three weeks. He drives back to the green flag and reburies the RTG.

The Pathfinder mission had been a failure because the lander experienced a critical failure. Mark brings the Sojourner inside thinking it just may need power to function again. He suits up and removes the battery from the lander and brings it inside. He rigs a way to recharge it and waits, hoping it works. The next day neither the Pathfinder or the lander have recharged.

JPL is able to establish a link to Pathfinder and receives an automatic message. The stats indicate that the camera is working. Mark finds that the lander's antenna has turned and is pointing toward earth. NASA knows he's alive. After three months, he's actually going to talk to another human being. After he goes inside instead of jumping for joy, he sits down and cries. The Pathfinder transmits a panoramic image which contains handwritten messages. The first one is, "Are you receiving?" The next one is, "Point here for yes." The technician points the camera at "yes."

Mark tells JPL they need to communicate using ASCII, a numerical code. They relay messages at the top of every hour. They ask his status, how he got hurt, how he's eating and tell him that they're working on a better communications system. Jack Trevor, a JPL software engineer, meets with Venk. He has an idea for a way to communicate with Mark. He thinks he can make Pathfinder talk to Mark's rover. They'll can send the data to Mark and have him update the rover. Annie wants a photo of Mark transmitted for the news media. The next day Mark is notified that he'll have to input code to update the rover's communication system. He also is told to pose for a photo. He does so in his spacesuit as he gives the thumbs up sign with a message that reads, "Ayyyyy!" Fonzie style.

Jack tells Venk that they can speed up the software update if Hermes would transmit the code to Mark. Venk still doesn't want to tell the Ares 3 crew on Hermes. The transcription process is difficult. Mark receives the code outside, uses a stick to write it in the sand, takes a photo and then goes inside to input it. Finally the system is online. They are able to correspond. Venk updates him on all their efforts and that the whole world is rooting for him. Mark is relieved when he learns that they will be sending Ares 4 pre-supplies to him at Ares 3. Teddy gives Mitch permission to tell the Ares 3 that Mark is alive.



Mark thinks back to being with his crew and landing on Mars. They had been advised of a storm raging on the planet. Houston authorized the astronauts to take EVAs after they landed despite the storm. Vogel, Lewis and Martinez left the Hab to take soil samples for chemical analysis. The Hab shook in the strong winds. All six astronauts wore their flight suits in case they had to make a rapid departure. Eventually, Lewis decided to abort the mission. They left the Hab in pairs. The visibility was almost zero as they stumbled toward the MAV. Mark suggested that they shore up the MAV to keep it from tipping. As he spoke, he was hit by flying debris. Mark was suddenly off-line and did not respond and his decompression alarm went off. He could only last a minute tops. Houston sent a message that the mission was scrubbed.

Lewis was going to look for Mark. She gave instructions to launch if the MAV began to tip over and leave her behind. The astronauts all knew that Watney was dead. The MAV was dangerously close to tipping over which would have spelled doom for everyone. Lewis finally gave up and made her way back to the ship. Once she removed her EVA suit, she took her place at the controls and ordered the launch. It was a smooth launch with no issues. There was only one problem; one astronaut wasn't there.

Four months after leaving Mark behind, the crew is anxiously waiting for an email delivery which will bring them word from family, friends and associates. There is a voice message from Mitch Henderson. He comes right out with it – Mark Watney is alive. Everyone is floored by the news. Mitch provides the details of what happened. They are not to feel guilty about it. Mark has stressed that repeatedly. Lewis disobeys Mitch and blames herself.

## Analysis

Mark is able to locate the Pathfinder and Sojourner two elements of a failed unmanned mission. He is jubilant because he might be able to rejuvenate the communications systems in the equipment and actually be able to communicate with a human again! Mark would have to admit that before he was abandoned on Mars, he would have never been overjoyed by the discovery of what was basically space debris, broken remnants of man's failure. Yet he has nothing and a broken piece of junk is at least something. His grand tragedy makes him appreciate the small treasures. It shows how things can change including one's perspective. Mark was stripped of everything perhaps even his life. Finding the old discarded equipment is a moment of jubilation and hope for Mark.

Mark's experience is symbolic of renewal. Mark hailed from a privileged life of above average income and celebrity. He was known far and wide as a hero and brave adventurer, one of the few belonging in the rarefied air. He was a pioneer and a historic figure who was advancing mankind. Now on Mars he literally has nothing. The fame, money and adoration all mean nothing and have all disappeared. Mark is starting over again in a hostile environment from which he may never escape.

What are his values now? Do they come down to life or death and nothing more? The death he would suffer would be slow and agonizing. Although Mark is in dire



circumstances with not much chance of surviving, his finding the Pathfinder was a hint of a first step toward renewal.

Renewal suggests a leaving behind of what's wrong in one's life. Mark does not dwell on regrets in his former life. But everyone has experienced personal pain and broken relationships which gives renewal more relevance and depth and hope for the future.

## **Discussion Question 1**

Why does Mark decide to communicate using ASCII code? What plan does Jack Trevor come up with to improve communications with Mark?

## **Discussion Question 2**

What instructions did Commander Lewis given the crew when she went to look for Mark? What danger did the storm hold for the MAV and what would have been the repercussions?

## **Discussion Question 3**

How far away is the next scheduled mission to Mars? What does NASA plan to send to Mark to keep him alive? How did the crew find out that Mark was alive?

## **Vocabulary**

atmospheric, telemetry, panorama, bandwidth, hallucinogenic, undulated, cacophony, proximity





# Chapters 13 through 15

## Summary

NASA is requesting constant updates on all of the Hab's systems. They're even trying to micromanage his crops. He also gets email dumps every day – from family and friends and also messages from other people concerned about him. He receives message from rock stars, athletes, movie stars – even the President. A lighthearted message from his alma mater officially proclaimed that he had colonized Mars. His favorite message was from his mother who thanked God he was still alive, told him not to die and his father says hello.

There is progress on the MDV. They'll drop the heavy heat shield so that it's light enough to fly to Ares 4. The launch for the Ares 4 pre-supply will take place the next year. Lewis sends an email taking full blame for abandoning Mark. He responds that bad luck was the culprit not her. Mark thinks back to when Ares 3 landed and Lewis and Beck erected the Hab from the pre-supply shipment. The Hab was designed to last only 31 sols or a little over a month. Mark does not notice the weak part of the canvass that's concealed by seal-strip. Every time Mark exits and reenters the Hab, it causes more stress that weakens the structure.

After a sandstorm on Sol 119, the Hab breaches when Mark reenters the airlock after being out on an EVA. From a small rip in the canvass it tears completely around the perimeter. The airlock detaches and the Hab's atmosphere escapes through the rip. Mark is thrown against the back of the airlock as it is launched into the atmosphere. It lands forty meters away. Mark hits the door face first. The airlock cartwheels another fifteen meters. He is barely conscious as he looks out the airlock window to see the pile of debris that used to be the Hab. He fixes a leak in the airlock and patches his cracked faceplate.

Mark wonders if it's wise to go to the Rover. There's no food or water or oxygenator in the rover. He needs to fix the Hab. He knows how to fix it but it will take a long time and his EVA suit is useless. He needs to get another EVA suit from the Hab. He decides to "roll" the airlock to get there. He tries several methods and finally is able to roll it toward the Hab. It took him 50 rolls to get to the Hab. His back is sore. He runs out knowing he has only four minutes of air.

Mark accessed the Hab through the hole where the airlock used to be. The Hab is in chaos. He finds Martinez's EVA but it's under a canvas wall that he can't move. He doesn't have time so he grabs another helmet and heads out to the rover. He can't communicate with NASA because the Hab is offline.

The next day, Mark reenters the Hab, moves the wall and takes Martinez's suit. He spells out, "A-okay" in rocks to ease NASA's worries. Once he fixes the Hab, he'll be able to reestablish the link with NASA. The plants are destroyed and he'll have no way



of replacing them. Between the potatoes he already has and the food packs, he estimates that he'll have enough food until Sol 600. The presupplies won't arrive until Sol 856. He'll be long dead by then. NASA sends a note that they're working on the food situation.

Bruce calculates that they have 465 days to get food to Mark. The trip will take 414 days; mounting the probe to the booster takes thirteen days. They have 48 days to make the probe. NASA is delaying the EagleEye team so they can use that booster. JPL tells Mark they are speeding up the presupply drop on the probe Iris. Rich Purnell, an astrodynamacist, maps out the exact courses and orbits for space missions. He usually maps these courses out based on the date of the launch. In the case if Iris, he maps out 25 courses for each of the days Iris could launch.

Bruce reports that his team is two weeks behind schedule. Dr. Keller says they can't reduce Mark's caloric intake any further to add more time. He could last three weeks on water after he runs out of food. Mark might have to drive a few days to get Iris after it's dropped. If they skip testing on the booster, there's a one in forty chance of mission failure.

JPL works day and night and finishes Iris in sixty-three days and is ready to launch. It will take 414 days to reach Mars. Mitch leads Mission Control in the launch. After all systems are "go" the countdown begins at fifteen. After launch, a slight shimmying is detected. Later, the shimmy gets more violent due to a weak bolt. The signal is lost. The U.S. Destroyer Stockton reports debris falling from the sky. The mission is a failure.

## Analysis

Mark encounters unbearable setbacks in his struggle to survive. He has to find solutions for each of the obstacles that is placed before him. Mark symbolizes man's resourcefulness and his basic instinct to survive – no matter the odds against it. Mark just didn't let himself think of not making it because it was a waste of energy. He preferred instead to think his way out of the unrelenting problems that faced him each day.

Mark had lived in the Hab for months. It was the only home he had and it had protected him from the harsh Martian elements and basically had kept him alive. One day when Mark was in the airlock attached to the Hab, a sandstorm blew up and literally ripped the airlock off the Hab and caused a tear that continued on around the entire perimeter of the Hab. There goes his house, his life-line.

Mark is resourceful and finds a way to repair the Hab and repair his EVA suit and faceplate. His resourcefulness, like that of all of mankind, is driven by the fundamental need to survive. As the saying goes, necessity is the mother of invention. In Mark's case, his life and death struggle was what compelled him on. To patch the airlock which was leaking and filling with dangerous CO<sub>2</sub> Mark cut a patch out of his EVA suit which he used to seal the airlock leak. Doing so he caused a leak in his suit which could also



spell his end. He used a piece of canvas from the damaged Hab to fix his suit which enabled him to enter the demolished Hab and find a back-up suit. Then he had to fix the Hab.

Fortunately for Mark, his basic need to survive was matched only but his unrelenting resourcefulness in the face of the impossible. Together with his training and knowledge, his was the perfect combination of the skills and characteristics that he needed to keep from dying on Mars. The character Mark Watney was a symbol of resourcefulness and man's instinct for survival.

## Discussion Question 1

What are the signs that Mark has become a celebrity? How does NASA plan for Mark to get from Ares 3 to Ares 4? How far away is Ares 4 from Ares 3?

## Discussion Question 2

While Mark is still in the Hab, what happens when there is a sandstorm at Ares 3? What are the dangers of leaks after the incident and how does he fix them?

## Discussion Question 3

Why does Mark have to spell out messages in rocks? How long will the trip with the pre-supply take to get to Mars? How long will it take the JPL crew to make the probe?

## Vocabulary

micromanage, schlep, propagated, binary, anticlimactic, astrodynamicist, makeshift, jettisoned



# Chapters 16 through 18

## Summary

Guo Ming, Director of the China National Space Administration, is leading the launch of the Taiyang Shen, an unmanned probe that will be in Earth's orbit for two days. It was China's first heliogy probe to orbit the sun. Zhu Tao tells Guo Ming that the launch is on schedule. They discuss the Iris failure.

Zhu Tao suggests that there is enough fuel to get the probe to Mars in 419 days. Details about China's launches are all kept secret. NASA has no idea that they could help. Guo Ming wouldn't want reimbursement; he would want NASA agree to send a Chinese astronaut to Mars. He is sure the State Council will go for it – save an American and put a Chinese man on Mars!

Bruce announces to the JPL team that they are being given another chance with the Taiyang Shen. It can't get to Mars until six weeks after Mark runs out of food. NASA's working on ways to stretch his food supply. The Taiyang has no landing apparatus. It will crash land on Mars. They have twenty-eight days to finish the probe. Bruce splits the tasks up into two teams.

Rich Purnell stops by Venk's office and hands Venk a plan to save Mark. Venk calls a secret meeting to explain what Project Elrond is. Rich Purnell has devised a way to get Hermes back to Mars on Sol 549, 35 sols before Mark runs out of food. Hermes would pick up a resupply probe with provisions for the extended trip then return to Mars. Mark would have to get to Ares 4 3,200km away to use the MAV so he could ascend to Hermes. They would use the Taiyang Shen booster to rendezvous with Hermes for the probe transfer. The Taiyang Shen option risks one life; the Rich Purnell option risks six. Teddy decides to go with Iris 2. Mitch is enraged and has Rich's plan sent via email to the Ares 3 crew. Together they decide to rescue Mark and will have to override Mission Control to do so.

Brendan Hutch is in charge of Mission Control from 1 a.m. to 9 a.m. Mission Control receives a message from Hermes advising Houston that "Rich Purnell is a steely-eyed missile man." Hermes is off course – intentionally off course. Teddy accuses Mitch of tipping the Ares 3 crew off. Teddy tells Mitch if they die it's his fault. Mitch replies that Lewis made the decision.

Mark can't believe that the crew is coming back for him. He received a list of tasks he has to carry out before they arrive. He has to prepare to drive the rover to Ares 4. The trip will take over forty days. Once he gets there he'll have to modify MAV which will take over 35 days. He needs one hundred days to get there and get everything done. NASA is working on a plan to use both rovers, one as a trailer to carry more equipment. One of Mark's tasks is to make power line modifications which he does without a hitch. NASA will have to figure out how to power everything.



He also has to make extensive modifications to the rover to carry all his supplies. Using a drill it takes him days to make a big hole in roof of the rover to allow some of the equipment to stand upright and be covered by a “balloon,” actually a piece of canvas that will balloon out. One day he has a scare. His drill lost power temporarily. After he recharges it, it works fine. However, he makes the horrifying discover that the Pathfinder’s guts had been fried. He has lost all contact with Earth.

Mark uses rocks to spell out in Morse code the news that the Pathfinder is fried and that he’ll continue with plans to travel to the Ares 4 MAV. Mark devises his own ways to transform Rover 1 into a trailer. He decides that he can do without some equipment like the water reclaimer to lighten the load. He takes a test run with a load of rocks to test the weight capacity of the converted rover. He is able to maintain a speed of 25km until he runs out of power. At that rate he can make it to Ares 4 in 64 days. He’ll need extra days to stop and recharge the oxygenator which will expand his trip to 92 sols which is too long.

Mark retrieves the RTG for extra power and heat. He attaches 21 additional solar panels on the roof and another seven panels on L-brackets affixed to the sides of the rovers. He is able to return the battery to Rover I which will give him more room and power. In final preparation for his trip, he removes everything from the rovers that he absolutely doesn’t need. He has enough room for two large batteries in the Hab.

According to his calculations, the Hermes resupply probe is being launched in two days from China. He’s worried about his crew.

## Analysis

Self-interest is showcased in the episode involving the Chinese government. The Chinese Space Administration ostensibly shows its humanity by reaching out to the Americans to offer their booster in NASA’s attempt to recover Mark Watney. The Americans did not ask the Chinese for the use of their booster which was ready to launch because they didn’t know it existed. China is a secretive nation that keeps its science and research under the radar. Although it works out in this instance, nations that keep such information secret can be anathema to the advancement of mankind.

In this case had the Chinese not decided to speak up, the Americans would never have known that the Chinese could have helped them. In fact, the two Chinese officials at the Space Administration even considered as much and calculated the benefit to them if they did so. The Chinese did offer their help but it wasn’t without strings which demonstrates the self-interest that people and countries oftentimes have in offering their help or making charitable donations. The Chinese wanted NASA to include a Chinese astronaut on a future mission to Mars. The officials also commented that saving an American astronaut would be good PR for them.

That the Americans wouldn’t know the Chinese had a rocket booster ready to launch lacks a little credulity. It is difficult to believe that the U.S. would be unaware of an



upcoming Chinese launch, something that the world of U.S. intelligence would find interesting and probably know.

Mark symbolizes the humble and silent hero, the John Wayne of the skies. He can't believe that the crew is coming back for him. Although as a professional scientist and astronaut he has a good sense of self, Mark shows his naturally unassuming nature. Perhaps his ability to prioritize and put events before his own welfare is something that helped him meet the unending challenges that he confronted on Mars.

## **Discussion Question 1**

Why doesn't NASA know about the Chinese booster? What advantage do the Chinese see in helping the U.S. rescue Mark? What do they want out of it?

## **Discussion Question 2**

What is Rich Purnell's job at NASA? What is his plan for rescuing Mark? Why does Teddy Sanders opt to go with Iris 2 instead?

## **Discussion Question 3**

How does the Ares 3 crew find out about Rich Purnell's plan? What risks for the crew are inherent in Purnell's plan? How do they defy NASA?

## **Vocabulary**

pulverized, connotation, redundant, inertia, tenacious, counterintuitive, depressurized, consumption



# Chapters 19 through 21

## Summary

Venk, Teddy and Mitch travel to Beijing to monitor the launch of the booster. Ares 3 crew members exchange messages with their loved ones who understand the risk involved in returning to Mars. On a CNN report, Venk is interviewed and explains Hermes' rendezvous with Taiyang Shen. The probe is simply a shell full of food and other supplies. The Taiyang will send it to Hermes and Major Rick Martinez, the Hermes pilot, will guide it to the ship's docking port.

American and Chinese engineers cheer together at Jiuquan Mission Control with the launch of Taiyang. Martinez keeps his eyes on a screen that shows the docking port and stats on the probe's telemetry. The astronauts, as a team each doing their own part, successfully bring in the probe.

Mark has finally finished all the necessary rover modifications. He had placed the AREC (atmospheric regulator external component) on the outside. He completed a heat reservoir using the RTG. Mark devotes most of his "free" time planning his trip and pours over several maps of Mars that he found in the Hab. Traveling to Ares 4 he will be heading toward the Schiaparelli crater that is surrounded with a lot of hilly and rocky terrain. There are other risky areas to drive in like the rugged terrain of Arabia Terra. He dreads being in the rover for such a long time. He decides he needs a place where he can stand and walk without his EVA when he stops the rover for breaks. He will make a tent where he can rest and lie down and sleep.

Mark had used the canvas on one of the pop-tents for his preparations. The other pop-tent is in perfect shape. He can attach it to the rover's airlock so he can pass from one to the other without wearing an EVA suit and can keep an eye on controls and stats. He makes the tent taller by gluing down a canvas overlay. He has to depressurize the Hab when he takes a chunk of its canvas for his tent. He patches and seals on the Hab, repressurizes it and makes it livable again. He won't need it much longer.

Mark is sick of eating potatoes but he is saving his meal packs for special occasions along the road. He is bringing 1,692 potatoes with him, a supply of vitamins and 620 liters of water. He will depart on Sol 449 which gives him 59 sols to test everything again. The prospect of leaving the Hab which has been his home for months is a little unsettling.

Mark tries to put all the essentials in the rover and the less important items in the trailer. The trailer will be packed fairly tightly with the two huge Hab batteries, the regulator, the oxygenator and the RTG powered heat reservoir. He will have the bedroom folded up in the rover he drives as well as two extra EVA suits, tool kits, sealants and other emergency repair equipment.



Mindy shows Venk a photo of Mark that was recently captured when he was on an EVA loading the rover. Venk tells Mindy that her new job is to watch Watney and focus on examining the imagery of Ares 3 exclusively. Her other duties will be given to fellow employees. NASA needs to know exactly what he's doing. He's running out of time.

With Mark taking out so much of the life supporting equipment to take with him he had to make sure that the time he still had in the Hab would be safe. He took measures to make sure the CO2 didn't rise to dangerous levels. He tested his tent bedroom and had to reinforce a seam to correct a minor pressurization problem.

At a meeting with Venk, Mitch, Teddy and Annie, Mindy reports that Mark finished the trailer according to their designs. Randall Carter, a NASA meteorologist reports that a sand storm is brewing in Arabia Terra. It's slow moving and will make visibility difficult. These storms can last for months. They block the sun making it impossible for Mark to keep his solar panels charged. He won't be visible until he emerges from the storm.

The crew of the Hermes has a progress meeting. There are minor repairs needed. The engine should last as long as the degree of tarnish doesn't increase. The engine wasn't meant for a voyage this long. Mark tests his rover and trailer driving it in circles for five sols. He averages 93km per sol. The bedroom is large and comfortable. He make adjustments to make it warmer. He drills himself on folding up and re-erecting his tent. He is able to take his EVA off when the bedroom is set up. Everything has been tested and retested. He shut down the systems in the Hab. He finally leaves for Schiaparelli.

## Analysis

Mark finds leaving the Hab which has been his home for over a year surprisingly difficult. The Hab symbolizes safety and life, the mother ship – even the mother. It has been his protector and has nourished him and was the principal reason he has survived as long as he had. He prepares to leave for his rescue or for his death. There are no in-betweens. He's forced to leave his safety zone and venture into the relative unknown. Will rover make it to Ares 4? Will there be any snags with the rescue? Ahead of Mark is nothing but questions as he leaves behind the protection of the Hab.

The author foreshadows big problems for Mark. There is a treacherous sandstorm brewing that will cross his path as he drives toward Ares 4. Since these storms can last for months, it will undoubtedly present an obstacle for Mark in completing his trip on time. By this point in the story, the reader is aware that the window for Mark to get to Ares 4 for his rescue is a narrow one. The Hermes will arrive and be in orbit and only has a limited time to make contact with Mark.

The clunker that the author tosses into the rescue attempt gives the reader pause and extends the suspense. Will this finally be the problem that Mark cannot overcome? Will this be the end for him? Adding another layer of suspense, NASA is unable to communicate with Mark and cannot warn him. Mark will not initially know that he's in the storm. It will slowly dawn on him. Adding even more suspense and dread, the storm will





block the sun and Mark will not be able to recharge his solar cells which are his main source of power. The author has set up a multi-headed demon that Mark will have to contend with at the end of his ordeal. And it will be the end – either of his abandonment or his life.

## **Discussion Question 1**

Why does Mark have last minute conflicts about leaving the Hab? What does Mark plan to eat for “special occasions” on the road? What will he eat otherwise?

## **Discussion Question 2**

Describe the modifications that Mark has to make to the rover? What photo does Mindy show Venk and what new job does he give her?

## **Discussion Question 3**

What bad news does the NASA meteorologist have about Mark’s trip to Ares 4? What dangers do sandstorms present to Mark and his effort to get to Ares 4 on time?

## **Vocabulary**

abject, theoretically, ballast, homage, dissipation, imagery

# Chapters 22 through 24

## Summary

After ten days, Mark arrives at a valley called Mawrth Vallis. The floor of the valley is flat and easy to drive on. Venk is interviewed again by CNN and admits that Mark has a real challenge but isn't doomed. He acknowledges that the sandstorm will block the sun and that Mark is depending on the solar panels for energy. Mark should hit the storm in about twelve days. The build-up of the storm will be subtle. Mark won't notice it at first until he realizes he's running low on power. Mark navigates using his map, a crude sextant he rigged up and by the orbits of Phobos, Mars' moon and the distant star Deneb in the Cygnus constellation. He spends thirteen hours a day allowing his solar panels to recharge his batteries. The terrain is getting more rugged as he enters Arabia Terra. He is careful to drive between Rutherford and Trouvelot, two large craters.

Mark will have to attain escape speed in the MAV when he ascends to the Hermes. He's on the lookout for a large crater called Marth Crater. Lewis sees that Mark entered the storm the day before. They have to brace themselves for the possibility that he won't make it to Ares 4. He notices that the solar panels aren't producing as much energy as they had been. He arrives at the rim of Marth and will have to plot a way around it. He notices that the solar cells are acting up.

Mark tries to figure out the shortest way around Mars. He talks a short EVA and notices that he can't see the far side of the crater. When he looks back at the rover, the air is much clearer. He realizes that there's a dust storm which has what caused the problems with the solar cells. Mark writes "Dust storm. Making Plan," in Morse code.

Mark needs to move on and he needs power to do so. He needs to travel faster than the storm and get around it. First he has to figure out the shape of it which he can do by dropping off two solar cells at distances 40 kilometers to compare their loss of power with one at his camp. That way he'll get a general impression of the size of the storm and which direction it's moving in. He is able to determine that the storm is circular, is north of him and that it's traveling west. He plans to drive south and then east to avoid it.

Mark drives south for several sols and finally makes it past the storm. His solar cells are at 100 percent power. He went 540km out of his way and calculates that he'll make it to Ares 4 by Sol 498, only four days late. Mark is nearing the entrance to Schiaparelli. After that it's only three sols to the MAV. Mark arrives at what he terms the "entrance crater," which is a small crater that leads to the Schiaparelli basin. The slope down to the basin is rough but he avoids the small dunes and carefully drives over the larger ones. His left front wheel sinks into some soft turf causing the rover to roll over on its side. Mark's solar cells fly off the roof in all directions. The trailer plunges into the soft turf and flips over. The rover, with Mark inside, tumbles down the slope until it stops on firmer terrain.



Mark didn't get hurt and the pressure valve is intact. Nothing seems to be broken and there are no leaks. He's most concerned about the solar cells and the trailer. Mark is only 220km from the MAV. He's not going to let this incident stop him from getting there. He pulls his EVA on and checks for damage. Three solar cells are destroyed but he'll have enough without them. He needs to right the rover and the trailer. Fortunately, the trailer's balloon didn't pop. Mark sends a Morse code message that says, "Rolled. Fixing now."

Mark is able to pull the rover upright using electrical cabling. The rover's systems are all functioning. He has to flip the trailer end-over-end and hook it to the rover to do so. He dug a hole and drove the rover forward. When the nose of the trailer hits the hole it flips over and lands upright. He decides to drive slowly through the rest of the basin in case he hits another soft spot.

NASA is relieved that Mark was able to recover from the accident. JPL is working around the clock to get the instructions for the MAV modifications. Mindy calculates that Mark should arrive at Ares 4 in a few days. When Mark is about 50km away from the MAV, he receives a blip from it. The MAV is silently waiting for Mark's arrival. When he arrived, he put his spacesuit on and stumbled toward the MAV then leaped in the air in celebration. He enters the MAV's airlock and closes the door behind him.

## Analysis

More drama is added to the plot when Mark's rover is flipped over as he drives down the slope of the Schiaparelli crater. His front wheel catches some soft turf and Mark is unable to stabilize it. As Mark nears his date with destiny, the author continues to throw out more obstacles and events that at first blush seem impossible for Mark to handle. The author is adding last minute drama to the story as though he doesn't want to let go of the peril that Mark has been experiencing. But the end is near – whatever end that turns out to be – and the reader is exhausted and fairly certain that Mark will survive any unexpected dilemma that he encounters.

When Mark flips his rover in the crater, he remarks that he is only 200km away from the rescue point. Nothing is going to stop him now. He wants to get to the Ares 4. By this time, the reader agrees. It's time for Mark to get to the rendezvous spot and stop the drama. Both Mark and the reader are weary and ready for the conclusion that seems to be obvious. The author has shown his hand too many times for the reader to think that Mark won't make it now. If he doesn't, that will be a huge surprise.

The blip that Mark receives when he is just 50km from the MAV, represents the end of his journey and hope that his ordeal is truly over and that he'll be able to return to his life on earth and his career as an astronaut.



## Discussion Question 1

What three sources of navigation does Mark use on his journey? What is unique about the terrain of Mars and what must Mark look out for and avoid?

## Discussion Question 2

Why doesn't Mark know he's in a sandstorm? How does he finally discover that he is? Describe the process he uses to figure out the shape, size and direction of the sandstorm.

## Discussion Question 3

What causes Mark to have an accident when he drives down the slope into the Schiaparelli crater? How does he recover and survive? What compels him to keep going?

## Vocabulary

panorama, symmetry, ambient, furl, interplanetary, voyeur, ominous, conical



# Chapters 25 and 26

## Summary

Mark does a system check and boots up. He has to wear his spacesuit until life support kicks in. Houston congratulate him on his amazing journey. They'll be sending him instructions for the MAV's modifications.

Bruce tells Venk there's a problem. The MAV is designed to orbit Mars at 4.1 kps; the Hermes will be flying at 5.8 kps. They will need more hydrogen to make up the difference which Mark can convert from some of his water. Also, the MAV has to lose some weight -- all non-essential gear and systems will go including the nose of the ship. Martinez will guide the MAV remotely from the Hermes.

Mark has 43 sols to prepare for the rendezvous with the Hermes. MAV is in such pristine condition that he hates to think about tearing it apart. He begins clearing the MAV out and making the prescribed modifications. On board the Hermes, the crew is doing drills in anticipation of the fly-by to get Watney. Martinez says he can grab the MAV at five meters per second; there's a narrow margin of error.

Mark is perhaps the only person in history to trash a \$3 billion spacecraft. He's gotten used to working by himself and making his own decisions but it's comforting to have a team of geniuses at Mission Control to help him. After much effort, Mark has made all the NASA modifications with six sols to spare. The day before the fly-by, Lewis has each crew member do a final review and check. Beck will be tethered to the airlock and pull Watney in.

Venk recognizes that if something goes wrong, Mission Control can do nothing about it. With just four hours to go, Mark is sitting in the MAV, suited up for the transfer. He could be back with his crew or he could die that day. He thinks about Mars and how it had been his home for the last year. There are no more tasks, no more challenges... he's left his last footprint on the Red Planet. He's leaving Mars... one way or the other.

Johanssen, the computer whiz, verifies that the fuel pressure is good and that the engine alignment is perfect. She then advises Lewis that the crew is ready for preflight checklist. The last crew member to check in with his "go" is Mark. The crew members affirm that all systems are "go." Beck is floating in the airlock tethered to the wall. Vogel is standing on the floor of the airlock, his boots clamped to the floor. Beck wants Vogel to untether him if he can't quite reach Mark. The countdown starts at T-minus ten. Watney is lying on the acceleration bench as the MAV starts to rumble. It launches with unbelievable force throwing Watney back into the couch. Martinez is not getting the speed he needs. Watney doesn't respond to transmissions. He hears Lewis's voice but it seems like a dream. Mark passes out.



Venk explains to Annie that the launch missed badly causing the intercept gap to be way too big. They have to rotate the ship to get to him at which time they'll be going the equivalent of 90mph. The crew is having a hard time slowing the Hermes down. Mark is still unconscious but the feed from his spacesuit is providing his vitals and they know he's alive.

Mark comes to and contacts Hermes. Lewis tells him about the launch problem and that they corrected the intercept distance with their attitude adjusters. Mark suggested he poke a hole in his EVA and use the escaping air as a thrust and guide himself to the dock. Lewis suggests they breach the VAL – vehicular airlock – to achieve reverse thrust. If too much air is infused the nose of the Hermes will blow off. Martinez runs the numbers and confirms that breaching the VAL could work.

Lewis instructs Vogel to make a small bomb to make a hole in the VAL airlock door. The bomb shreds the VAL airlock door and reverses the ship's direction. Beck is able to see the MAV. Soon Beck is close enough to touch the torn canvass on the MAV and yells, "Contact!" With only eight seconds left in the intercept, Beck grabs onto Watney and the two men float across the MAV to the opening. The Hermes pulls the two men on Beck's tether. At velocity zero, Lewis orders Vogel to pull them in. Lewis contacts Houston to advise them that six crew members are safely aboard. Mission Control explodes with cheers and applause. The next order of business is to get them home.

Mark Watney had broken two ribs when the MAV launched. Mark high fives with the crew. He's bandaged and told to take a shower – it's been over a year since he had one. Mark thinks of all the people who worked at saving him. His crew risked their lives coming back to rescue him. He was saved because there's a basic instinct in human beings to help each other. It is the happiest day of Mark's life.

## Analysis

Mark has reached the pick-up point. A motif that has been increasingly obvious is mimicked in this last portion. The author applies yet another layer of drama at the very end. This time the problem is on board the Hermes. The speed and thrust of the spaceship is apparently a problem. The solution turns out to be to make a "small" bomb to breach the airlock so that the influx of air creates more thrust. Sounds dangerous.

This last obstacle to the rescue is designed to make the reader consider a horrific scenario. Perhaps Mark had suffered all he suffered over the last year plus, successfully traveled a perilous 3,200km course on hostile territory and arrived on time at the point of rescue and it was all for naught. There's the chance that Hermes will be unable to make contact or even blow up. This last minute drama evokes a "now what" response but again there is no doubt that the rescue will still go off. The rest of the story has followed this same motif, no matter what the problem Mark, NASA or the Ares 3 crew members always solve it.



There is more drama when Beck floats from the Hermes on his tether to snatch Mark. Beck tells Vogel that if he can't reach Mark to untether him, thus risking his life. Vogel refuses to agree to Beck's request but as it turns out it isn't necessary. Beck is able to pull Mark out of the MAV and float over into the Hermes docking station.

## Discussion Question 1

After Mark arrives at the MAV, what instructions does NASA send him? Why must Mark "gut" the MAV after arriving at Ares 4?

## Discussion Question 2

What roles do Martinez and Beck play in Mark's rescue? Why does Commander Lewis direct Vogel to make a small bomb? What common substance does he use to make it?

## Discussion Question 3

How much time is remaining when Beck calls out that he has "contact" with Watney and is bringing him in? What is the velocity when Watney is pulled in?

## Vocabulary

copious, pristine, velocity, improvising, latency, vector, conflagration



# Characters

## Mark Watney

Mark Watney is an astronaut and botanist and a member of the Ares 3 crew who traveled through space to Mars for a brief stay during which they would conduct experiments and research. Ares 1 and 2 before them went off without a hitch. The same level of success was expected for Ares 3. But things went awry. After the astronauts touched down in their MDV, they erected their living quarters known as the Hab. The unassembled housing unit was delivered in a presupply dump prior to their arrival.

A vicious sandstorm blew up making visibility nearly impossible. Since some of these Martian sandstorms can last months, NASA decided to scrub the mission and ordered the crew members to board the MAV for their rendezvous with the orbiting Hermes which was the long-distance spacecraft that would take them home.

As the astronauts grabbed essentials and stumbled toward the MAV they could barely see anything. Suddenly, Mark Watney was hit with a large antenna that had been ripped off by the storm. He was knocked over and soon passed out. No one could see Mark. They presumed he was dead because there were no vital signs being transmitted by monitors in his space suit. Although the commander hunted for him as best she could, there was no hope. They had to leave his body behind.

Mark woke up to see that the MAV was gone. That meant that the crew was on its way home and that he was abandoned. Mark was a well-trained scientist and astronaut and took on the challenge of trying to save himself although alone and in a hostile environment. Initially, there was no communication with NASA. Mark kept his calm and took on every challenge that he encountered – from eliminating toxic CO<sub>2</sub> in the air so he could breathe, heating his rover with dangerous plutonium, growing his own potatoes, traversing the rugged Martian terrain and driving down into one of the largest craters on Mars where he had a serious accident that almost did him in. Mark kept his spirits up and was finally able to make it to Ares 4 where his crew guided his MAV to the Hermes docking station and, after being stranded for 18 months, he was pulled inside. Commander Lewis reported to NASA Mission Control that all six crew members were present.

## Venk Kapoor

Venk Kapoor is the director of Mars operations. Venk was devastated by the loss of an astronaut on the Ares 3 mission. The President, the administrator of NASA, the Ares crew and countless others around the world had given speeches and eulogies about Mark Watney and what a pioneer in interplanetary space travel he had been. He would forever be a hero to NASA, the United States and to the world. When asked if he would like to offer his thoughts and words in a speech, he declined. Venk was bitter – what





good would it do? Mark Watney was dead. All the nice words in the world would not bring him back.

Venk lost sleep and focus after the tragedy. He was in charge of the program but yet with a tragedy like this, there was nothing he could do. The tragedy just told him how powerless he and NASA was in facing an unexpected event like the loss of an astronaut. It had happened before but not to him. Venk was annoyed one night when Mindy Park, an engineer who was in charge of imagery coming from the Ares 3 sight on Mars, contacted him late one night. She insisted that he come right in. What she showed him was worth the trip. She pointed out how the Ares 3 rover (a jeep-like ground vehicle) had been in one spot in one image and in another spot the next day. It was moved! There were other changes that she noted, Venk was naturally astounded by the news and recognized that there was only one way that these changes could have occurred. Mark Watney was alive!

The revelation that Mark was alive was, of course, great news. But Venk faced the challenge of his career: was there a way to rescue Mark and a way to keep him alive until that rescue? Venk announced the news to NASA officials who all shared Venk's shock, joy and concern about what to do next. Venk ordered JPL (Jet Propulsion Labs) to work around the clock to develop a probe that could drop supplies to Mark to keep him alive while NASA worked on the larger problem of rescuing him. Venk was worried about how the other Ares 3 crew members would take the news. They were on their way home and had to focus on that. He was concerned that they would feel guilty and that they would lose their edge in the challenge of traveling home always presents.

Venk spared no cost in money or resources and counted no rescue plan that was presented to him. He was as dedicated to keeping Mark alive and rescuing him as Mark himself was.

## **Teddy Sands**

Teddy Sands is the administrator of NASA. He is very involved in the plans to rescue Mark Watney. He tries to keep a cool head for the rest of the staff. He is in agreement with Venk Kapoor that the surviving members of Ares 3 not be told that Mark is alive. He doesn't want them to feel guilty; they have a ten-month ride home and doesn't want to add more stress on them. Eventually, he relents and allows the flight director, Mitch Henderson, to tell the crew.

When Teddy is given the choice of using a plan that involves sending the Ares crew back – known as the Purnell plan – or the Iris 2 plan to make a pre-supply drop at Ares 3 that involves no crew members, he opts for the latter. He would rather risk one crew member versus the death of six astronauts.



## Mitch Henderson

Mitch Henderson is the flight director for all the Ares Missions to Mars. He is a dynamic leader who puts the welfare of his astronauts first and foremost. He is in a heated dispute with Venk and Teddy. He wants his crew members told that Mark is alive. He thinks they deserve to know. Later when the Purnell plan that involves the Ares 3 crew members to return to Mars and rescue Mark surfaces, he is all for it. But he is shot down by Teddy and Venk. He takes matters in his own hands by sending an email to the Ares 3 crew so they can make up their own mind about returning to Mars for Ted. He bets that they will go and his is proven to be correct.

## Commander Lewis

Melissa Lewis is a geologist and astronaut and the commander of Ares 3. When the sandstorm that caused NASA to scrub the mission hit, it was Lewis who went searching for his dead body. The visibility was so low that Lewis could barely see the ground. She hunted around for him but to no avail. She had given instructions for the crew to leave her behind if she didn't return in time for the MAV lift off. But she gave upon the hunt and returned just in time to get on board the MAV. She hated leaving Mark behind even though he was presumed dead.

Lewis blamed herself for the incident even though she wasn't personally at fault. But as commander, it was her crew and she was returning home one short. When she discovered that there was a plausible plan for rescuing Mark and it involved the Hermes returning to Mars, she and the other crew members didn't hesitate.

Lewis led the astronauts in nerve-racking steps in Mark's final recovery. She took the risk of having a bomb made to blow open one of the airlocks to give the Hermes more thrust. That could have spelled death for everyone, but Lewis made the tough decision to try to save Mark no matter what the risks were. She very calmly contacts NASA after Mark's recovery and informs Mission Control that six crew members aboard.

## Martinez

Martinez an Ares 3 crewmember and its pilot. He pilots the Hermes which is heading back to Earth. When the crew has a change of plans and must do a "fly-by" in Earth's orbit to pick up a supply probe, he guides the probe into the docking area. When the Hermes is orbiting Mars to rescue Mark, Martinez remotely pilots the MAV that lifts Mark up to rendezvous with the Hermes. He also negotiates the tedious procedure in bringing the MAV into the Hermes docking station.



## Johanssen

Johanssen is an astronaut and crewmember on the Ares 3. Johanssen is the last face that Mark saw before he was hit by debris and fell. She is a computer whiz and is relied upon to run stats and make calculations on the Hermes' course and their trek to pick up Mark from Mars. She confirms to Lewis that the crew is ready for its final checklist prior to rescuing Mark.

## Beck

Beck is an astronaut, engineer and Ares 3 crewmember. During the rescue Beck is tethered to the airlock where Mark will be pulled in. It's a gravity-free zone where he is literally floating as he waits for the moment of recovery. He tells Vogel that if he can't reach Mark he wants him to release his tethers so he can reach out further. Vogel refuses to agree to his request. Beck is able to enter the MAV where Mark is strapped in. He grabs him and the Hermes drags Mark and Beck along on the tether for a brief period before Beck is able to access the airlock entry on the Hermes.

## Vogel

Vogel is an astronaut and the chemist on Ares 3. He is instructed by Commander Lewis to make a "small" bomb that will breach the airlock to allow more air in that will provide the Hermes with more thrust. Vogel makes his small bomb partially out of sugar. The gambit works and the Hermes is able to maneuver closer to the MAV where Mark is in orbit waiting to be picked up.

## Annie Montrose

Annie Montrose is NASA's PR person. She holds regular press conferences to update the media on the Mark Watney story and on his possible rescue. She is a cynical individual who curses like a sailor. When she first learns that Mark Watney is still alive, she is not overjoyed. She focuses on how she's going to explain his sudden resurrection to the press.

## Mindy Park

Mindy Park is an engineer at NASA. She is in charge of monitoring the Ares 3 site and receiving imagery from the planet. She is the first to discover that Mark is alive. She observed that a rover was parked in one spot one day and another the next day. She observed other changes to the site and immediately contacted Venk Kapoor, the director of Mars missions, with the astounding news.



## Guo Ming and Zhu Tao

Knowing about the U.S. attempts to help their stranded astronaut, Guo Ming, Director of the China National Space Administration, and Zhu Tao, another official with the program, decided that it would be a humanitarian move to offer their completed booster that was ready to launch. They also recognized that it would be good public relations to help save the astronaut. They didn't want to be reimbursed for the booster; they only wanted the assurance that a future mission to Mars would include a Chinese astronaut.

## Bruce Ng

Bruce Ng is an executive at JPL (Jet Propulsion Labs) and is in charge of building the Ares Mission probes, boosters and presupplies. He has his team at JPL work day and night on building a probe in record time in an effort to get food to Mark so he won't starve. They are allowed virtually no time for testing and experimentation and the probe that is referred to as Iris fails before it gets into orbit.

## Rich Purnell

Rich Purnell is the astrodynamacist at NASA. It is his task to map out exact routes for space flights. He has to take into consideration the time of year, the position of other planets, the orbits of the planets and many other details in order to develop an accurate mapping of the trip. It is a crucial part of all space missions. While he is working on 25 different maps for Iris 2 because it may launch on any of twenty-five days, he discovers a way and pathway for the Ares 3 crew to return in the Hermes spacecraft to Mars and in a "fly-by" rescue Mark Watney. His is a controversial plan because it risks the lives of the other five crew members of Ares 3 but it has more promise of success than Iris 2.



# Symbols and Symbolism

## MDV/MAV

The Ares Missions to Mars used a relay system to travel back and forth from Earth to Mars. The original Ares booster rocket would rendezvous with Hermes which was in orbit around earth. It was the spacecraft that had the power and strength to withstand the journey from Earth's orbit to Mars. "The Martian" is the story about Ares 3, the third mission to Mars. The two missions that had gone before had succeeded without any major incidents or problems.

When the Ares 1 and 2 crews arrived in Hermes and began their orbits around Mars, the final stage for the crew to actually ascend to the planet's surface was to take the MDV (Mars descent vehicle) that was contained on the Hermes down to the planet. The Ares missions were pre-supplied with equipment for their eventual arrival. The most important piece of equipment included in presupplies was the MAV (Mars ascent vehicle).

Obviously it was crucial that the MAV be present and available at the Ares site in order for the crew to be able to return to Hermes which would then return them to earth. In the case of Mark Watney, after he woke from his injury which the others thought left him dead, he knew he was in deep trouble when he saw that the MAV was gone.

## Hermes

The Hermes was the long-distance spacecraft that Ares crews used for the long flight from Earth's orbit to Mars's orbit. The Hermes was a craft that was powered by ion engines and had the wherewithal to withstand the long trek between the two planets. The trip from Mars to Earth was a ten-month trek. When the Ares 3 crew learned that they could possibly return to Mars and rescue Mark, they rendezvoused with a supply probe in a fly by in Earth's orbit. made a u-turn and headed back to Mars where they were to pick up Mark in another dangerous "fly-by." The Hermes itself wasn't designed for landings. It was strictly used as the long-distance workhorse in the Ares missions to Mars.

## The Ares Missions to Mars

NASA had dubbed their series of missions to Mars as Ares. Ares 1 and 2 had gone smoothly with no major hiccups or incidents. By the time Ares 3 had lifted off, NASA had great confidence in the program and did not expect any problems that they or the Ares 3 couldn't handle. They did not anticipate that one of the Ares 3 astronauts would be left behind and abandoned on Mars. There was no immediate solution to the problem. Initially, the only possible way to save him was for him to access the presupply that was



being sent for Ares 4. There was a big problem; Ares 4 was not scheduled to arrive for four years and the presupply a year or so before that. He would starve to death by then.

The final solution was a risky one – but there were no non-risky scenarios. Mark drove one of the Ares 3 rovers 3,200km across rough terrain and Martian craters to the pre-selected Ares 4 site so he could board the MAV that had been delivered in an earlier drop. The MAV would lift him into orbit so that the crew on the Hermes could make contact with him and pull him safely on board where he would reunite with his crew head home.

## Commemorative Stamp

The Post Office Department issued a commemorative stamp honoring Mark when it was first announced that he had died on Mars. That had to recall the stamps because they don't honor living people. They had to recall all the stamps that had been sent out to post offices. It had never before happened in the history of the post office. It was speculated that the stamps that had already been sold had greatly increased in value.

## Pathfinder

Mark recalled that an unmanned probe named Pathfinder had failed and that it remained at a specific spot on Mars. It wasn't far from the Hab so Mark got into the rover with hopes of retrieving it. Pathfinder was equipped with a communications system. Mark thought he might be able to refurbish it so he could contact NASA. When Mark took off in the rover to find it, NASA caught on that he was looking for Pathfinder. NASA dug in and helped reconnect with Pathfinder. Mark worked at cleaning up the system but didn't initially make connection. The next day he saw that the Pathfinder's antenna was turned toward earth. From that he knew that the Pathfinder had reestablished communications with NASA. Mark was finally able to communicate with Earth.

## The RTG

When Mark did a test run in the Rover, he realized that he needed more manufactured heat to battle against the frigid Martian air but he didn't want to drain the energy he needed to power his rover. He thought of the RTG (radioisotope thermoelectric generator) which is fundamentally a large box of plutonium. It's a radioactive element that can heat up by itself. The RTG captures radiation from the plutonium in the form of heat and transforms it into electricity. RTGs have been used to power unmanned space craft. An RTG is what powers the MAV. The plutonium makes the device toxic. After the crew initially arrived on Mars, Lewis had Vogel bury the RTG four kilometers away from the Hab and mark it with a green flag to warn any future crews of the dangerous element.



## The Taiyang Shen Booster

Like everyone else in the world, the Chinese Space Administration heard about the dilemma that Mark and NASA was facing. The Chinese space program was very secretive so no one knew that they had scheduled the launch of a probe the Taiyang Shen in the near future. It wasn't a landmark launch so the Chinese decided to offer the U.S. the use of its booster that was ready to launch. The U.S. was working on a booster to launch a presupply to Mars. The Chinese booster would save the U.S. valuable time. The Chinese saw it as a good gesture because they would be helping to save an American astronaut. All they wanted in return was NASA's guarantee that a Chinese astronaut would be on a future mission to Mars.

## Iris I and II

As soon as NASA learned that Mark was alive they pulled all stops to devise a plan to get food to him. JPL worked around the clock to build a new probe to that they could use for the presupply delivery to Mars. They finished the probe in record time but in doing so ran virtually no testing or inspection on it. Unfortunately, Iris one exploded before it got into the Earth's orbit. Iris II was underway when another plan was developed to rescue Mark came to the forefront.

## The Rovers

Ares 3 had two rovers, large jeep-like ground vehicles, at its disposal. As important as the Hab and the MAV were in saving Mark's life, the rovers were just as important. He used a rover to retrieve the RTG and Pathfinder and made many test runs in advance of his long trip across the planet to Ares 4 for his rescue by the Ares 3 crew. Without the rovers he would have perished.

## The Purnell Plan

NASA's astrodynamist Rich Purnell was responsible for plotting the courses for all space flights. He would base maps on orbits, the position of the planets, the sun and stars. It was quite a complicated process. It occurred to him that the Hermes could basically make it to Earth's orbit to pick up supplies and return to Mars to rescue Mark. It was a controversial plan that was at first rejected as too risky by NASA administration. When the Ares 3 crew found out about the plan, they disobeyed their bosses and unanimously decided to follow the Purnell plan and rescue Mark.

# Settings

## Ares 3

Ares 3 is one in a series of four NASA missions to Mars. The site where the Ares 3 astronauts were to make their home base while on Mars was referred to as Ares 3. The site consisted of the Hab which contained the living quarters of the astronauts, Rover I and Rover II which are two jeep-like ground vehicles that the astronauts use in conducting their research and experiments. Also on site at Ares 3 are the MAV, Mars ascent vehicle which is brand new and never been used and had been delivered on an earlier drop and the MDV, Mars descent vehicle, which is how the astronauts got from their mother ship, the Hermes, to Mars's surface. When their work brings them outside, the astronauts must wear EVAs (extra-vehicular activity) suits so that they have no problem with the toxic atmosphere.

## The Hab

Prior to the landing of the Ares 3 crew on Mars, several deliveries (drops) were made so that the astronauts would be equipped with everything they needed for the mission that they wouldn't be bringing with them. One of the most important items that was included in these drops was the Hab which would serve as the habitat or living quarters for the astronauts while they were on Mars.

The Hab was climate-controlled and had multiple systems that mimicked the air on Earth and maintained its safety for the astronauts. The Hab was delivered unassembled so the astronauts had to first erect the frame and then attach its outer canvas-like material that kept the good air in and the bad air out. The Hab became Mark's home for a year. When he finally left the Hab, he had some pangs about leaving it. It had helped keep him alive for a year. He was leaving the Hab's safety zone for uncertainty and risk. But of course he had to go.

## Ares 4

The Ares 4 crew was not scheduled to arrive on Mars until four years after Mark was abandoned. However, there would be probe presupplies delivered. The MAV was already there. Ares 4 was 3,200km away. When it was finally decided that Mark would travel to Ares 4 he looked forward to a long trek to the site which was literally on the other side of the planet. It was at Ares 4 that the Hermes guided the MAV to its docking station and rescued Mark.





## The Schiaparelli Crater

The Schiaparelli crater is one of the largest impact craters on Mars. It is nearly 300 miles wide and is surrounded with very rough terrain. The crater is directly in the patch between Ares 3 and Ares 4. Mark didn't have the time or temerity to go around it so his mapped out plans included driving down into the crater and driving across its vast basin.

All went well until one of the rover's wheel caught some soft sandy turf and flipped the vehicle on its side. The trailer he was towing also flipped over. He was fortunately able to right both vehicles without major damage. He made sure to drive slow during the rest of his time in Schiaparelli.

## NASA/Mission Control

The home base for astronauts on all missions is NASA. The administrator, director of Mars operations and the flight director make all the decisions for the missions. However, in the case of the incident with Mark Watney, the crew overrode orders to come home and not consider the rescue mission. They disobeyed NASA to rescue their fallen colleague. Mission Control is alternatively referred to as "Houston" as in, "Houston we have a problem," because it is based in Houston.



# Themes and Motifs

## Abandonment

An obvious theme of “The Martian” is abandonment – since the astronaut Mark Watney was literally abandoned on Mars, abandonment is a natural theme. It wasn’t a mean-spirited or vicious act by his fellow crewmates. They thought he was dead; the vital signs transmitted from his space suit were flat lines. There was nothing for the crew members to conclude other than that he was dead. They tried to search for his body in the midst of a raging sandstorm but they couldn’t find him. Although it pained them, the crew was forced to leave their deceased friend and colleague behind or else risk their own lives.

There are many forms of abandonment. In the case of “The Martian” his was a physical abandonment. Emotional abandonments that are often discussed in dysfunctional aspects of personal relationships. Children can feel emotionally abandoned when their parents are overly focused on career and don’t pay the adequate amount of attention to them. An individual who is consumed with an addiction like alcohol or drugs also emotionally abandons his family. A couple begins to feel abandoned by one another when there is not enough attention and focus on their relationship and they drift apart.

On the surface, Mark’s abandonment was only a physical one. He wrote in his log that he didn’t blame his crew for leaving him behind. He would have done the same thing. Instead of becoming angry and bitter over his dire state, Mark decided that he would fight to survive and try to devise a plan that would keep him alive long enough to be rescued by the next Ares mission to Mars scheduled to land in four years.

Mark was a trained astronaut and scientist and it is reasonable that he took the reins of the situation and did the best he could to deal with the obstacles and challenges he faced in order to survive. But Mark is also a human. This element of the story would have been more credible if the author had allowed some raw emotion into the story, anger, pain, angst and blame. Although there is no evidence in the story of Mark feeling abandoned emotionally, it’s that likely that anyone in the same circumstances would have felt hurt and devastated. After all he was left behind; he was abandoned.

## Tenacity

One of the outstanding characteristics that Mark Watney displayed during the many months that he was stranded on Mars was tenacity. He kept a log of his experiences which illustrated his great sense of humor even in the face of almost certain death. Perhaps it was his spirit and sense of humor that got him through the tough times. Mark possessed an inner-strength that kept him focused and determined to survive. It was amazing that that after each catastrophe, and there were many, Mark seemed to be



more determined. Instead of throwing his hands up the air as many would, he used his energy to think of viable solutions.

The first problem that Mark faced was the abandonment. He had been clobbered by debris during a sandstorm and had been knocked out. The astronaut's spacesuits were all equipped with electronic monitors that would transmit vitals to the entire team. Mark's suit must have malfunctioned – perhaps it was damaged in the unrelenting storm – because no transmissions of his vitals were sent to the other crew members. It told the crew that Mark was dead. There was no other answer. There was a search for his body but the visibility was so poor that they couldn't see more than a few inches in front of themselves. The storm was ready to damage the MAV which was the only way the living astronauts could escape the planet.

When Mark came to there was no bitterness – only a determination to find a way to survive. He had a limited amount of food. He took potatoes, cut them up and planted them. In a few months he had a room full of potatoes that promised to stretch his food supply by months. He wanted to communicate with NASA but contact had been lost in the storm. He didn't let that stop him. He recalled that an unmanned probe that had failed had been abandoned nearby. He found the probe and was able to establish contact with NASA.

Mark was in an airlock when another storm ripped it off from the Hab and sent Mark flying. The Hab was wrecked but instead of giving up he repaired it and got it livable again. When he drove the rover to Ares 4, his front wheel got caught in some soft sand and flipped him over. He knew he was only 200km from Ares 4 where the rescue attempt was to take place. He wasn't about to let a little tumble in a Martian crater stop him.

Mark's knowledge and training was crucial in his surviving his ordeal but it also took his positive spirit and unwillingness to give up that saw him through the toughest times.

## Sacrifice

There are many examples of sacrifice in "The Martian." Firstly, there is the fundamental sacrifice made by all astronauts. They are dedicated to their missions and take the constant risk of losing their lives or being abandoned or lost in space. It is difficult to imagine many sacrifices that could be considered more selfless. This basic sacrifice is made stronger with the recognition that these selfless people have healthy egos and possess self-worth yet are able to serve the god of greater purpose.

When Mark is injured in the sandstorm at Ares 3 and presumed dead, Commander Lewis insists on looking for him. She gives orders to leave her behind if the MAV begins to shake and threaten to tilt over and she's not back yet. She was willing to sacrifice her life to find the body of her dead companion.

When the prospect of the Ares 3 crew returning to rescue him is presented to Mark, he doesn't want them to come. They will all be risking their lives. He cannot equate the loss



of one life with the loss of six. But it wasn't his decision to make. Once again, the crew who were devastated about the tragedy, sacrificed their lives by returning to Mars to rescue him. There were a plethora of reasons that the crew could have offered for not going back, but they didn't consider even one of them. Without hesitation, their minds were immediately made up and focused on the long journey back to get their friend. Knowing that the odds were not good and that could all die didn't stop them.

The loss of money isn't a value that is comparable with human sacrifice. However, with an organization like NASA money is always a consideration. But in the case of the rescue of Mark Watney money was not a barrier. He had to modify the Ares 4 MAV for his lift off to Hermes. He literally had to trash a \$3 billion dollar, unused spacecraft on the orders of NASA. The return trip to Mars was hundreds of millions of dollars. When it was all over, Mark wondered why they thought he was worth that much.

## Loyalty

Loyalty emerges as a main theme in "The Martian." There are, of course, different forms of loyalty and many of them are seen in this story. It is conventional wisdom that astronauts are among the most dedicated people in this or any world. Their loyalty is to NASA, to science, to their mission but most of all their loyalty is to one another – their fellow crewmates. A crew of astronauts who have been selected for a mission must function as one entity. There can't allow competition, resentment or personal feelings to enter into their relationships. The smooth functioning is necessary for the success of the mission and oftentimes it is a matter of life and death. The crew must be able to react in one voice and spirit in cases of emergency. The Ares 3 loyalty for their lost crewman was what drove their initial devastation at his loss and fueled their determination to rescue him when they learned that he was still alive.

Mark Watney was the botanist on the mission and he was devoted to doing his assigned tasks to the best of his ability. Of course everything changed in his world when he was left behind on Mars. He was dedicated to his survival. And like a true astronaut trained to be part of a team, he had no bitterness for the other Ares 3 crew members who unintentionally left a living astronaut and crewman behind. He knew that they had followed procedure and that he would have done exactly the same thing. When he learned that they were returning to rescue him, there was a knot in his stomach. It was one thing if he didn't make it out. It was quite another to risk the entire crew. He didn't want them to take that risk but the decision wasn't his to make.

Like the crews, NASA is dedicated to the missions and to further man's knowledge of space and interplanetary travel. However, their first loyalty is to their crew members. Venk Kapoor, the director of Mars missions, couldn't even speak and offer his thoughts on the tragedy. He was torn up and bitter. When a viable plan was presented to him that could perhaps work and rescue Mark, Venk cleared everything else off the deck and dedicated all his efforts to saving Mark. NASA likewise spared no cost in funds or resources to get Mark back.



“The Martian” is an action/drama but its underlying richness is the loyalty to a fellow man that was expressed by all concerned.

## Humanity

A strong sense of humanity is a theme that runs throughout the story of “The Martian.” The entire world mourns the loss of the astronaut, Mark Watney, who died on Mars after being mortally wounded in a vicious sandstorm. From his other Ares 3 crewmates to his NASA bosses and Mission Control in Houston to the U.S. President and people in all corners of the world, his loss is a tragedy. Mark Watney was a hero who had dedicated himself and made the ultimate sacrifice for the advancement of humankind.

When the NASA engineer whose job it was to observe Ares 3 on Mars saw that the rover vehicle had moved and observed other changes that could not be made without human intervention, she knew that Mark Watney, the astronaut who the world mourned, was alive – maybe not alive and well – but alive. As soon as the top brass at NASA got the word, they dedicated themselves, their resources and their staffs to devise a way to save Mark. The distance between Earth and Mars was the biggest issue. It would have been easy and a plausible response to the crisis to declare a rescue or a food drop to be impossible but no one even considered it. NASA and JPL worked literally around the clock to come up with a solution. It was obvious that saving one human life was the most important mission that NASA could ever have. Everything else was put on hold and no one complained. The word was behind their efforts.

Billions of dollars were expended in saving Mark. He comments that he was undoubtedly the only person in history to have orders to trash a \$3 billion spacecraft. NASA ordered the destruction because it had to be lightened up so that it could rendezvous in the same orbit as the rescue ship that was coming for him. The \$3 billion was not even a blip on the radar. Of course they would destroy it if it meant saving Mark.

The entire world waited for word of his rescue. From China to Chicago and from New York to Trafalgar Square, people were on the edge of their seats. They wanted to celebrate the rescue of the astronaut and wanted to celebrate the saving of one life.

# Styles

## Point of View

“The Martian” by Andy Weir is written in both the first person and third person. The premise of the book is that Astronaut Mark Watney has been abandoned by his crew on Mars and there is no apparent way for him to be rescued or any plausible way for him to escape by his own volition. Mark is keeping a daily log about his experiences and during those sequences, the story is written in Mark’s voice and from his perspective.

Other portions of the book are written in the third person limited omniscient. For example, Venk Kapoor is an executive at NASA and the reader learns of his thoughts about Mark’s dilemma along with his worries and concerns about the space program and the rest of the Ares 3 crew. The reader also is privy to the thoughts, feelings and motivations of other characters in the story including other NASA officials and Ares crew members.

The author, Andy Weir, is an admitted space exploration junkie. His life-long interest in outer space is demonstrated by the technical perspective that he brings to the story. In an essay at the conclusion of the book, Weir has included an essay entitled, “How Science Made Me a Writer.” The essay brings in the perspective of Weir’s experiences and long-time interests in science, programming and space which all were important elements of the story.

## Language and Meaning

The character of Mark Watney is written as upbeat and as an individual who is determined to survive. Even in the dire situation in which he finds himself, he makes many lighthearted and humorous comments in his diary. He makes jokes that reference what people in the distant future will think when they find his log. His jokes are self-deprecating and he shows no serious resentment about his dire circumstances and does not point fingers of blame at anyone. He is a professional, a scientist and an astronaut. He understood the risks of interplanetary travel and accepts his abandonment. He doesn’t accept his ultimate death on Mars but he recognizes that it could happen.

Mark is an astronaut and his extensive training is vital for his survival. The technical language that is used in describing the tasks he must undertake in order to live demonstrate a first-hand and intimate knowledge of the complicated and scientific nature of the subject at hand. Mark works with equipment that no one else has heard of including the oxygenator, the RTG (radioisotope thermoelectric generator), the water reclaimer, airlocks, and EVA (extra-vehicular activity) suits. He refers to days as “sols” which are solar days that are slightly longer than 24 hours.



Mark drives his rover on the surface of the moon avoiding craters like the Marth and the vast Schiaparelli and negotiating the rugged terrain of Arabia Terra. He drives between the Rutherford and Trouvelot craters to stay on course and avoid skidding into them.

Not surprisingly, Andy Weir is a “lifelong space nerd” with a passionate interest in relativistic physics, orbital mechanics and the history of space exploration. His knowledge is demonstrated in the language and technical descriptions that are an important part of the story, provide credibility and consume a substantial portion of the text.

## Structure

“The Martian” by Andy Weir is the story of an astronaut on a mission to Mars who was presumed to be dead and was left behind by his commander and crew. The story is told in the first-person by the protagonist, Mark Watney, and by the narrator. The portions of the story from Mark Watney perspective are in the form of an epistolary – a series of daily log entries that Mark kept during his ordeal.

Mark devotes most of his entries to the problems that he encounters in his new world and the methods and solutions he devises to solve them. The entries do not place much focus on how Mark feels about his dire circumstances. The rest of the story – how the crew and NASA are reacting to the events of the day – is told in the third person. The majority of the story is told in a chronological order. There is one important flashback which is used to describe the details of the incident that led to Mark’s abandonment.

Preceding the first chapter there is a map of the surface of Mars where Mark was stranded and where he had to travel on land to Ares 4 where the rescue attempt was taking place. The map shows the many craters and rough terrain that Mark had to traverse to arrive at his destination.

After the conclusion of the book there are sections entitled, “A Reader’s Guide,” “A Conversation with Andy Weir” and “An essay from Andy Weir” How Science Made Me a Writer.”



## Quotes

Guys, if you're reading this: It wasn't your fault. You did what you had to do. In your position I would have done the same thing. I don't blame you, and I'm glad you survived.

-- Mark Watney (Chapter 1 paragraph Page 2)

**Importance:** Mark has been lost in space. He was on a mission to Mars and he was abandoned by the rest of the crew who made it back to earth. He is writing a daily log in which he tells them he doesn't blame them in hopes that they may someday read his journal.

I'm no stranger to Mars. I've been here a long time. But I've never been out of sight of the Hab before today. You wouldn't think that would make a difference but it does.

-- Mark Watney (Chapter 7 paragraph Page 75)

**Importance:** Although Mark Watney did not want to be in the Hab on Mars, it had become his home in that it was safe and kept him alive. The thought of leaving it even just for an experimental excursion is unsettling because if he got lost or was unable to return to the Hab, it was certain death.

It's a strange feeling. Everywhere I go, I'm the first. Step outside the rover? First guy ever to be there! Climb a hill? First guy to climb that hill! Kick a rock? That rock hadn't moved in a million years.

-- Mark Watney (Chapter 9 paragraph Page 99)

**Importance:** Mark is feeling just how alone he is. While he is making history with every move he makes, it just reminds him that he's alone and stranded on Mars.

The whole time I was recovering Pathfinder, I imagined what this moment would be like. I figured I'd jump up and down a bit, cheer, maybe flip off the ground (because this whole damn planet is my enemy), but that's not what happened. When I got back to the Hab and took off the EVA suit, I sat down in the dirt and cried.

-- Mark Watney (Chapter 12 paragraph Page 116)

**Importance:** When Mark establishes contact with Earth, he has a different reaction than he thought. He had been alone on Mars for three months at this point and had been stuffing his fears and panic trying to think of a proactive way to survive by himself. Reconnecting with earth allowed him to vent all that frustration.

Normally, an incident-free launch would be cause for celebration. This one earned only silence broken by Johanssen's gentle sobbing.

-- Narrator (Chapter 12 paragraph Page 143)

**Importance:** The crew of Ares 3 was forced to leave Mark behind. They were certain he was dead because after he was struck by debris his decompression alert went off which





had given him only a minute to live. They lost him in the storm and couldn't find his body. They had to leave him behind.

Once he runs out of food, how long until he starves to death?' Teddy asked. 'Presuming an amply water supply, he might last three weeks.

-- Teddy/Dr. Keller (Chapter 15 paragraph Page 179)

**Importance:** NASA officials are trying to figure out how much time Mark has before he starves to death and if they can get supplies to him to save him.

From the VIP observation room, Teddy watched the despondent Mission Control Center. He took a deep breath, then let it out. He looked forlornly at the blue folder that contained his cheerful speech praising a perfect launch. He placed it in the briefcase and extracted the red folder, with the other speech in it.

-- Narrator (Chapter 15 paragraph Page 191)

**Importance:** As far as NASA knew the last hope to save Mark's life had just been lost. The supply ship that they sent exploded before he got into orbit around the Earth. There wasn't time to prepare another ship that would get there before he starved to death.

Space is dangerous. It's what we do here. If you want to play it safe all the time, go join an insurance company.

-- Mitch (Chapter 16 paragraph Page 206)

**Importance:** Mitch the flight director doesn't like the NASA administrator's decision that may leave Mark stranded on Mars and die there. He's trying to cajole him into deciding for a riskier rescue mission that could risk the lives of six astronauts.

Just once I'd like something to go as planned, ya know? Mars keeps trying to kill me.

-- Mark Watney (Chapter 18 paragraph Page 229)

**Importance:** This quote captures Mark's frustration with his latest problem. He's lost contact with Earth. He is personifying Mars as the enemy who is trying to kill him.

I've been in mortal danger for months; I'm kind of used to it now. But I'm nervous again. Dying would suck, but my crewmates dying would be way worse.

-- Mark Watney (Chapter 18 paragraph Page 242)

**Importance:** Although Mark of course wants to be rescued and not die on Mars, he is more concerned that the risk his crew is taking to save him will risk their lives. He'd rather sacrifice himself than the other five crew members.

If the seal on the bridge doesn't hold, we'll get sucked out at close to the speed of sound. We'll be jelly with or without suits on.

-- Commander Lewis (Chapter 26 paragraph Page 356)

**Importance:** Commander Lewis responds to Martinez who asks if they should be their



spacesuits on when they plan to breach the spaceship in order to achieve proper thrust to intercept with the MAV and rescue Watney. Lewis is explaining that if their plan fails, they'll all be dead.

The cost for my survival must have been hundreds of millions of dollars. All to save one dorky botanist. Why bother? Well, okay, I know the answer to that. Part of it might be what I represent: progress, science, and the interplanetary future we've dreamed of for centuries. But really, they did it because every human being has a basic instinct to help each other out.

-- Mark Watney (Chapter 26 paragraph Page 368)

**Importance:** Mark is aware of the professional and scientific reasons that everyone went to great lengths to save him. But he attributes the underlying reason to simply human kindness.