Proof

ⓘ INTRODUCTION

BRIEF BIOGRAPHY OF DAVID AUBURN

David Auburn was born in Chicago to Mark and Sandy Auburn. He grew up in Ohio and Arkansas before moving back to Chicago for college. From 1987 to 1991, Auburn attended the University of Chicago, from which he graduated with a B.A. in English Literature. After graduation, Auburn moved to Los Angeles to work for Amblin Entertainment for a year before relocating to New York City where he studied in the Julliard School's playwriting program. In 1997, Auburn's first full-length play, *Skyscraper*, was produced Off Broadway. He then moved to London to be with his future wife, Frances Rosenfeld. While in London, Auburn started writing *Proof*, which he brought back with him to New York City in 1998. The play was picked up by the Manhattan Theatre Club, where it premiered in the year 2000. *Proof* won the 2001 Pulitzer Prize. Since writing *Proof*, Auburn has written several plays and screenplays. He currently lives in Manhattan with his wife and daughters.

HISTORICAL CONTEXT

Proof explores the sexism that women face in the field of mathematics. Historically, women have been underrepresented in math and the sciences. For hundreds of years, math was seen as an inappropriate topic for women to study, which *Proof* alludes to when main character Catherine tells Hal about Sophie Germain, a real-life French mathematician who wasn't allowed to study at universities because she was a woman. Even Germain's parents tried to discourage her from studying math. Sophie Germain was only able to secure a mentorship by using a male pseudonym, which she did when writing to mathematician Carl Friedrich Gauss. She made many contributions to the field of mathematics, such as her discovery of specific kind of prime numbers, numbers that are now known as Germain Primes. While women are now allowed to study math and science, many negative stereotypes regarding women's mathematical intelligence stubbornly remain. These stereotypes and cultural attitudes contribute to the gender-gap in math and science, which still persists today. For example, in 1995 (shortly before Auburn wrote *Proof*), under 23% of U.S. doctoral math students were female. By 2014, that number only slightly shifted, with just under 29% of doctoral math students being female.

RELATED LITERARY WORKS

Proof's use of math to explore literary themes makes it comparable to other math- and science-related plays, such as Tom Stoppard's 1993 play *Arcadia* and Michael Frayn's play *Copenhagen*. In both *Arcadia* and *Copenhagen*, the playwrights use scientific concepts to explore (among several themes) the topic of uncertainty, which is a topic also discussed in *Proof*. Auburn's *Proof* is a drama about a dysfunctional family, a topic explored in another famous Pulitzer Prize-winning play: *August: Osage County*, by Tracy Letts. In *August: Osage County*, characters also deal with a family member's death, which leads to the unraveling of different family relationships. *The Silver Linings Playbook*—a book by Matthew Quick that was later adapted to film—is another work that explores family dysfunctionality, as well as the effects of mental illnesses. In addition to *Proof*, some of David Auburn's well-known works include *Skyscraper*, a play about characters trying to save a historic building from demolition, and *The Columnist*, a drama about real-life journalist Joseph Alsop.

KEY FACTS

- **Full Title:** Proof
- **When Written:** 1997-1998
- **Where Written:** London, United Kingdom & New York City, New York
- **When Published:** 2000
- **Literary Period:** Realism
- **Genre:** Play
- **Setting:** Chicago, Illinois
- **Climax:** When Hal tells Catherine that he believes that she wrote the proof
- **Antagonist:** Catherine's sister Claire, Hal (at some points), sexism, and mental illness

EXTRA CREDIT

Cinematic success. Following *Proof*'s critical success in theatres, David Auburn adapted the play into a film by the same name, which was released in 2005. Gwyneth Paltrow, who starred as Catherine, was nominated for a Best Actress Golden Globe Award for her performance.

Progressing Primes. In the play *Proof*, Catherine tells Hal that the largest Germain prime known is $92,305 \times 2^{16,998} + 1$. This comment dates the play to the late-1990s, as larger Germain primes have since been discovered. As of 2020, the largest known Germain Prime is $2,618,163,402,417 \times 2^{1,290,000} - 1$, a number that yields 388,342 digits!

📖 PLOT SUMMARY

It's late at night, and Catherine is sitting on her back porch in Chicago. Her father, Robert, comes outside, startling her by asking if she can't sleep. She explains that she's waiting for one of his students to leave, and he points to a bottle of champagne and wishes her a happy 25th birthday.

Robert asks Catherine to do some math with him, and when she refuses, he sternly tells her that she has been wasting her talent. Catherine isn't convinced that she has much potential, especially in comparison to Robert, who was already famous by the time he was her age. Catherine then asks Robert when his illness set in. As he explains that he was in his mid-twenties when he "went bughouse," he realizes that Catherine is afraid that the same thing will happen to her. He tries to reassure her that she'll be okay, but Catherine points out that their conversation is a bad sign: Robert is dead, which means she's imagining him.

Robert disappears when Hal, one of his former students, steps out onto the porch. Hal has been going through the 103 notebooks that Robert left behind, searching for publishable work. Catherine believes that Hal is wasting his time—she's certain that the notebooks only contain gibberish. But Hal wants to be sure.

On a hunch that Hal is trying to steal Robert's notebooks to take credit for his work, Catherine demands to see Hal's backpack. When he refuses to hand over his bag, she snatches it, but there's no notebook inside. As Hal starts to leave, Catherine sees that he has forgotten his jacket—when she picks it up, a notebook falls out. She calls the police. As she's speaking with the dispatcher, Hal tries to explain, reading aloud an entry in which Robert thanks Catherine for taking care of him. She hangs up the phone, and Hal says that he was going to wrap the notebook and give it to Catherine as a birthday gift. After he leaves, Catherine cries.

The next morning, Catherine's sister Claire is on the porch. Claire pesters Catherine with questions, asking whether she is feeling okay and what her plans for the future are now that Robert is gone. When Catherine asks why Claire is interrogating her, Claire says that some policemen stopped by that morning to check on Catherine, who was reported to have behaved erratically the previous night. When Catherine tells her sister about Hal, Claire doesn't believe he exists. She's worried that Catherine is going crazy and encourages Catherine to move in with her in New York City. But then Hal arrives to continue reading the notebooks, and Catherine insists that she doesn't need Claire's help—she's not imagining people, and she's fine on her own.

Following Robert's funeral that afternoon, Claire hosts a party. During the celebration, Hal joins Catherine on the porch. The party is going late, which Hal says is because mathematicians are intense partiers—some of the older ones even take amphetamines to keep up with the younger men. After pointing out the sexism in his comment, Catherine tells Hal of Sophie Germain, an 18th century mathematician who was discriminated against because of her gender. Hal kisses her. He quickly apologizes, but she says it's alright. They kiss some more.

The next morning, Hal joins Catherine on the porch. Things are awkward until Hal tells Catherine that he'd like to spend the day with her, which makes her happy. She then gives him a key and instructs him to use it to open a drawer in Robert's office. As Hal leaves, an extremely hungover Claire joins Catherine on the porch. Claire asks Catherine again to move to New York City with her, but Catherine vehemently refuses, offended at Claire's assumption that she's unstable. Hal's entrance interrupts their argument. He carries a notebook with him as he profusely thanks Catherine. When Claire is confused, Hal explains that the notebook contains an important **proof**. He credits Catherine with finding it, assuming that it's Robert's proof—but Catherine announces that she actually wrote it.

The story flashes back to a September afternoon four years prior. Robert and Catherine are sitting on the porch when Catherine reveals that she is going to start school at the end of the month. They begin to argue but are interrupted by Hal, who gives Robert an envelope containing his dissertation. Robert congratulates Hal before announcing that Catherine will also be studying math, starting that fall. Catherine is surprised but pleased. Hal asks Robert if he is doing any work at the moment, but he says he isn't. Turning to Catherine, Robert says that she might "pick up where [he] left off." Suddenly remembering that it's Catherine's birthday, Robert suggests that they go out that evening. After Hal and Catherine exit—Catherine to get ready and Hal to leave the house—Robert opens a nearby notebook and begins to write the journal entry that Hal finds years later.

Back in the present, neither Hal nor Claire believe that Catherine wrote the proof. They think Robert wrote it: the handwriting looks like Robert's, and Hal insists that the math is beyond Catherine's capabilities. Hurt, Catherine offers to go over the proof with him, but Hal says that he and several colleagues will determine whose work it is. When Catherine refuses to give Hal the notebook, he stalks off.

The next day, Hal returns to the house to see Catherine, but Claire won't let him—Catherine is unwell. Claire accuses Hal of taking advantage of Catherine's instability by sleeping with her, which he denies. Claire then hands him the notebook, telling him to call her when he has more information.

The play flashes back to a winter day three-and-a-half years prior. Catherine steps onto the porch to see Robert wearing just a t-shirt while writing in a notebook. He excitedly tells her that his mind is working creatively again, and he hopes that the two of them can work together on the proof that he has started. He hands Catherine one of his notebooks and instructs

her to read it. She begins to read the notebook aloud, revealing that it's gibberish. Robert starts to shiver, and Catherine leads him back into the house.

The play jumps back to the present, about a week after Claire gave Hal the notebook. Claire is on the porch, holding a plane ticket. Catherine joins her, carrying some bags. When Catherine says that she could stay on her own in Chicago if she wanted to, Claire is adamant that she couldn't handle it. They keep arguing until Claire storms off in tears.

Catherine is still sitting on the porch when Hal runs up to her with the notebook. He tells her that he believes her now—the proof uses modern techniques that Robert wouldn't have known. He asks her to go over the proof with him, but she refuses. She is upset and tells him that he should have trusted her. After a moment, Hal asks whether she's really leaving Chicago. She tells him that it might be nice to be taken care of—she's afraid that she really does suffer the same illness as her father. Hal says that she is "not him […] Maybe she'll be better." Catherine hesitates, then she opens the notebook and begins to read.

👥 CHARACTERS

MAJOR CHARACTERS

Catherine – Catherine is the quick-witted, stubborn, and prickly protagonist of the play. Her father, Robert, was a famous mathematician, and when the play opens, he has recently died. Catherine (who is in her mid-twenties) has been caring for him for the past few years, and now that he's gone, she has to figure out what to do with her life next. This becomes a point of contention when Catherine's hectoring older sister, Claire, flies in from New York and suggests that Catherine isn't mentally stable enough to live on her own, which Catherine forcefully rejects. A recurring tension in the play is whether Catherine has inherited her father's mental illness—she's definitely prone to depression, but it's not clear whether it's anything worse. For instance, when she speaks with her dead father, it might be normal grieving, but it might be a hallucination, and Catherine herself doesn't even seem sure. What she *is* sure of (which she reveals near the end of the play) is that during the time she cared for her father, she wrote a complicated and groundbreaking mathematical **proof**, echoing the iconic work that Robert did when he was around her age. Initially, none of the other characters believe that she could have written the proof, including her father's former student Hal, with whom Catherine has recently become romantically involved. While Claire thinks Catherine isn't sane enough to have written it, Hal thinks she's insufficiently educated (she dropped out of college to care for Robert). His dismissal of Catherine's abilities reflects the rampant sexism among mathematicians, and it breaks Catherine's trust, sending her

into a tailspin. However, after reviewing the proof with some colleagues, Hal concludes that Catherine *is* telling the truth—she has written something that will change the field. The play ends with Hal and Catherine repairing their relationship, and it seems that Catherine will stay in Chicago and use the proof to catapult herself into a math career, just like her late father.

Robert – Catherine and Claire's father, Robert, was a brilliant mathematician and caring dad who also suffered from severe mental illness. At the beginning of the play, Robert has recently died, and a central question is whether he has passed his defining traits—his genius and his illness—onto Catherine, the daughter with whom he was closest. While Robert's illness is never explicitly diagnosed, his symptoms include hallucinations, delusions, and the compulsion to write huge volumes of nonsense in his notebooks. But the play also depicts his illness as inextricable from his genius: his mind didn't work like most other people's, which allowed him to make groundbreaking discoveries in periods of lucidity. Through flashbacks, Robert is shown to be an eccentric, lively, and caring father who takes pride in Catherine's talents, appreciates her company, and mentors her intellect. He and Catherine were incredibly close, and they lived together for his last few years of life, as she put her own education on hold to care for him. Fittingly, Catherine is a lot like him: she's also a mathematical genius, she's prone to mental instability, and she even shares his handwriting.

Claire – Claire is Catherine's older sister and Robert's oldest daughter. She is stylish, level-headed, and pushy. The pushiness becomes immediately clear when Claire arrives in Chicago for her father's funeral and asks Catherine to move to New York to live with her, since she believes that Catherine, like Robert, is too mentally ill to live alone. Catherine vehemently disagrees, but Claire seems not to listen. Throughout the play, Claire's plans and opinions are often at odds with Catherine's. This applies to small things (like how Catherine should care for her hair) and big ones—for instance, Claire thinks that Catherine made the wrong decision in caring for Robert at home, while Catherine and Robert (via his journal) disagree. The audience never gets much insight into Claire's values or motivations, so it's not clear whether her behavior towards Catherine is merely selfish and unempathetic, or whether it's more complicated—perhaps she's trying to overcompensate for her guilt over not being there when Catherine was caring for their father. Regardless, it's clear that Claire's presence grates on Catherine and sometimes genuinely hurts her, as when Claire doesn't believe that Catherine could have written the groundbreaking **proof** that Hal finds in Robert's desk drawer. This betrayal sends Catherine into a tailspin, which ultimately frustrates Claire so much that she leaves for New York alone.

Hal – Hal is one of Robert's former PhD students at the University of Chicago. After Robert's death, it's Hal who goes through Robert's 103 notebooks, searching through delusional

scribblings to see if there's anything with mathematical value. This means that Hal is a frequent visitor at Robert's (now Catherine's) house, which leads him and Catherine to socialize. While they initially have an antagonistic rapport (Catherine even calls the police on him once), she grows to trust Hal due to his kindness towards her, and they eventually develop a romantic relationship. Despite this, Hal maintains a somewhat sexist and patronizing attitude throughout the play, reflecting the exclusionary atmosphere of the male-dominated field of math. Catherine is a mathematical genius, but Hal seems to believe that because she's a woman and because she's not formally educated in math, she couldn't possibly have much knowledge or ability, and he often explains concepts to her that she already understands. Catherine proves him wrong multiple times throughout the play, but Hal still doesn't believe her when she claims to have written a groundbreaking **proof**—he assumes that the work must be Robert's, since Catherine couldn't possibly be such an innovative mathematician. This betrayal devastates Catherine, and she hardly gets out of bed for a week. But despite Hal's sexism, he's not inflexible—he goes over the proof with several colleagues and realizes that Catherine actually *is* the author, which leads him to try earnestly to make amends. In order to rebuild their relationship, Hal has to re-earn Catherine's trust, which he does by expressing confidence in both her sanity and her genius.

Sophie Germain – Sophie Germain was a real-life 18th century French mathematician, and Catherine looks up to her for her genius and for her persistence in the face of rampant sexism. In fact, Catherine first brings up Sophie Germaine in a moment when she herself is facing sexist assumptions about women in math. Hal has just implied that all mathematicians are men, so Catherine relays the story of Sophie Germain teaching herself advanced math while trapped in her home during the French Revolution. Germain wanted to study at a university, but none would accept women, so she furthered her career another way: under a male pseudonym, she wrote to a famous mathematician (a man named Gauss), and he mentored her via correspondence. In this way, Germain was able to produce groundbreaking mathematical work—and, once she was recognized for her abilities, she was able to reveal her true identity to Gauss, who remained supportive. While Germain lived centuries before Catherine, the two women share a struggle with sexism in math. Like Germain, Catherine has uncanny mathematical abilities that she struggles to convince others to recognize, and like Germain, Catherine has to produce groundbreaking work in order to be seen as credible at all.

Gauss – Carl Friedrich Gauss was a famous mathematician in the 18th and 19th centuries. When Sophie Germain, a gifted and ambitious female mathematician, wrote to him under a male pseudonym, he mentored her and helped her develop her iconic work. Gauss corresponded with Germain for some time before he discovered her real identity, after which he continued to support her. In fact, he expressed even more respect for her, knowing that she had to overcome so much sexism to develop her skills and become recognized for her work.

MINOR CHARACTERS

Mitch – Mitch is Claire's fiancé.

⦵ THEMES

In LitCharts literature guides, each theme gets its own color-coded icon. These icons make it easy to track where the themes occur most prominently throughout the work. If you don't have a color printer, you can still use the icons to track themes in black and white.

GENIUS AND MENTAL INSTABILITY

David Auburn's play *Proof* illustrates that there's a fine line between genius and mental illness. The play focuses on Catherine, a young woman who may have inherited both her father's mathematical genius and his mental instability. When her father, Robert, was alive, his delusion and genius were sometimes hard to differentiate—throughout his life, he was obsessed with math, but sometimes his work was groundbreaking and other times, in his periods of mental illness, his work was gibberish. Like Robert, Catherine is a talented mathematician who is prone to bouts of erratic behavior and depression. The tension between genius and illness comes to a head for Catherine when she reveals that she has written a ground-breaking mathematical **proof** during one of her periods of depression, and neither her sister, Claire, nor her father's former student, Hal, believe her. Rather than seeing this proof as evidence of her genius, they see it as a symptom of madness: she may be imagining that she is the author, or the proof could be gibberish (just like her father's later work), or she might have just claimed her father's work as her own. Of course, in the end, Catherine *did* write the proof, and she seems to be both a genius and somewhat unstable. This connection between genius and illness points out something that genius and madness have in common: the tendency to see what others can't.

In Catherine's family, genius and madness seem inextricably linked—one doesn't exist without the other. Robert, for example, was a mathematical genius who also suffered from mental illness, and it seems that Catherine is following in his footsteps when she writes an innovative proof during a bad depressive spell. By contrast, Catherine's sister Claire has inherited neither genius nor madness; her math skills are above average but not noteworthy, and she is levelheaded and emotionally stable. The implication is that, at least in their

family, genius doesn't come without madness—they're two sides of the same coin.

Genius and madness are also linked because they can be tough to differentiate; madness often looks like genius and vice versa. Robert was a ground-breaking mathematician whose revolutionary contributions to the field made him famous, and his genius lay in his ability to see patterns that others couldn't. But Robert's madness *also* came in the form of seeing patterns that others don't. For instance, Robert would sometimes suspect that "aliens were sending him messages through the Dewey decimal numbers on library books." Claiming to have invented new mathematical concepts and claiming to have been contacted by aliens are both unlikely and outlandish claims, which shows how genius and madness can resemble one another.

The play exploits this ambiguity between genius and madness to produce its central tension: whether Catherine really wrote a genius mathematical proof, or whether she's simply delusional. Like her father, Catherine's defining trait is her unique perception of the world, which can sometimes seem delusional and at other times brilliant. For instance, Catherine seems bizarrely paranoid when she interprets Hal's excitement over Robert's notebooks as evidence that Hal is trying to steal them and publish her father's work under his own name. She's partially right (he *is* trying to sneak a notebook out of the house), but she's dead wrong about his motives, which makes her seem like she's inventing facts that aren't there. But her most outlandish claim—that she wrote the proof tucked away in her father's desk drawer—turns out to be absolutely true, even if nobody believes her. It's worth noting that the play ties her ability to write the proof to her unique perception of things: she describes writing it as "just connecting the dots," even though those "dots" were not obvious to any mathematician but her. Prime numbers are notoriously tricky numbers in math—although the numbers are a sequence, there is no known pattern to them. For Catherine to find a pattern in prime numbers is to see something that others cannot. This is the crux of both her instability and her genius.

Both Claire and Hal make the mistake of thinking of mental illness and brilliance as being mutually exclusive. Claire sees the proof as "proof" that Catherine is delusional (as she suspects that Robert, not Catherine, wrote it). Hal sees the proof as "proof" that Robert was actually experiencing a period of genius when "everyone thought [he] was crazy." But the proof isn't so straightforward—it doesn't show that Catherine is crazy or that Robert was sane. Instead, it's evidence that Catherine is *both* genius and unstable: she wrote the groundbreaking proof while in a period of intense depression, making her mental illness inextricable from her brilliant discovery. In this way, the play suggests that people who experience mental instability are able to experience and interpret the world in a different way, which can help them discover brilliant things.

FAMILY AND HEREDITY

Throughout *Proof*, Catherine compares herself to late her father, Robert. Robert was a mathematical genius who revolutionized his field, and she worries that she won't live up to his example. She also compares her sanity to his; Robert suffered from mental illness, and Catherine constantly worries that any unusual thought pattern might be evidence that she shares his disease. This gives Catherine a mixed relationship to heredity: she wants to inherit her father's genius (and she's worried that she didn't), but she doesn't want to inherit his instability (and she's worried that she did). An enormous question for Catherine, then, is how much of her life is *hers* and how much is determined by her family and her genes. And this is especially complicated considering how similar she is to her father: Catherine and Robert share a passion for math, a prickly temperament, and their handwriting is even similar, which leads to real problems when she claims to have written a **proof** and nobody can tell at first whether she wrote it or he did. But, in the end, the proof is identified as hers—despite all its similarities to her father's work, Catherine's work is distinctly her own. This shows that, while she has inherited many traits from her father, Catherine is still able to carve out her own identity. Family and heredity have shaped her but not defined her.

Catherine's biggest anxiety about heredity is that she'll develop her father's mental illness. At the beginning of the play, Catherine expresses this outright. While having a conversation with her dead father, she asks him if this conversation is, in itself, evidence that she's crazy. After all, she is interacting with someone who isn't there. During this conversation, she also asks when her father's illness first appeared (wondering if her own symptoms are appearing in a parallel timeline), and she reveals that she "keep[s] up with the medical literature" on the role of heredity in mental illness. It's clear that Catherine is terrified that her genes will doom her to a life of similar mental instability. And there's some evidence that she's right. Not only does she have a conversation with her dead father (possibly a hallucination), but she also shows symptoms of depression and paranoia. So Catherine certainly shares some of Robert's traits, but it's not clear to what extent—just because she's prone to instability doesn't necessarily mean she'll be unstable in the same way.

Catherine also worries about inheriting her father's genius—namely, that she didn't inherit enough of it and therefore won't live up to his illustrious career. Like her father, Catherine has a talent and passion for math—the two bonded over it throughout his life, with Robert encouraging her and helping her hone her skills. While he hoped that she might "pick up where he left off," she worries that she won't be able to. By the time he was her age, after all, he had already revolutionized his field, whereas she is merely a depressed college dropout who has just lost the one person who believed in her: her dad.

But over the course of the play, it becomes clear that Catherine and her father are more similar than she initially lets on. Like her father, Catherine *has* done groundbreaking mathematical work before the age of 25, she just hasn't told anyone about it yet. And when she finally reveals the **proof** she wrote to Robert's former student Hal, he affirms its significance—it's the kind of work that only a genius like her father could do.

But no matter their similarities, the play asserts that Catherine is her own person—she's not merely a replica of her father. This becomes clearest near the end of the play when Hal is struggling to determine who actually wrote the proof. He initially assumes that it's Robert's work, since the handwriting looks like Robert's and, more to the point, the mathematical genius that it would require to write such a proof seems to point only to him. That Catherine's work initially seems indistinguishable from her father's underscores their similarities. Yet once Hal spends more time with the proof, he sees indications that Catherine is actually its author. For one, the mathematical style is different—it's less elegant than Robert's style and it uses new math techniques that Robert wouldn't have known. In addition, Robert dated all his writing, but this proof has no dates. With this, the play shows that Catherine—despite being so much like her father—has an identity of her own.

Furthermore, Hal suggests that the similarity between Catherine and Robert's handwriting is normal; "Parents and children sometimes have similar handwriting," he says, "especially if they've spent a lot of time together." This hints at a crucial point: that genetic heredity isn't the only form of familial influence. Catherine's handwriting doesn't resemble her father's because they're blood relatives—it's because they spent so much time together when he was alive. Maybe, then, her life resembles her father's both because of her genes and because he influenced her. This suggests that she's not necessarily fated to follow his patterns, no matter how similar they seem. As Hal tells her, "Maybe [she]'ll be better" than Robert.

SEXISM

Proof depicts sexism in the field of mathematics, exploring its effects on two characters: the main character, Catherine; and the real-life mathematician Sophie Germain, an 18th century woman whose life story Catherine relates during the play. Sophie Germain's gender locked her out of educational opportunities, so she advanced her career by writing to a famous mathematician under a man's name and developing her work through their correspondence. She couldn't reveal her gender until she had already proven her abilities, because otherwise she would not have been taken seriously. And while Catherine has the opportunity to go to college for math, sexism still stands in her way. This is clearest when her father's former student, Hal,

condescends to her about her abilities and then outright dismisses the possibility that Catherine wrote the groundbreaking **proof** she claims to have written. For both Catherine and Sophie Germain, getting credit for their innovative work hinges on whether men will believe in their abilities. In this way, the play demonstrates how the discrimination that women face not only limits their opportunities, but also threatens their chance at gaining recognition for their achievements.

The stereotype that women are not as intelligent as men often leads to women being excluded from opportunities. This stereotyping has been a problem for centuries, as Catherine reveals when she tells Hal about Sophie Germain. Germain wanted to be formally educated in math, but no school would accept her—historically, math wasn't seen as an appropriate subject for women, who were assumed to be less smart than men. Of course, Germain bucked this stereotype: she taught herself advanced mathematics and went on to make several important contributions to the field. Catherine likely sees herself in Germain. While Catherine was able to study math in school (she took a couple courses at Northwestern), she still encounters the stereotype that she is less intelligent than men, as her interactions with Hal reveal. To start, Hal assumes the role of going through Robert's old notebooks. When Catherine suggests that she go through Robert's notebooks herself, Hal immediately tells her that she "do[es]n't have the math" and that she "wouldn't know the good stuff from the junk." Hal doesn't know Catherine much at all, so his "evaluation" of her abilities is based on what he does know—her gender. In acting as a gatekeeper to Robert's notebooks, Hal is doing what the patriarchal society did to Sophie Germain: he's excluding Catherine from professional opportunities.

For both Sophie Germain and Catherine, the gender-based discrimination that locks them out of opportunities also threatens their chance of being recognized for their achievements. Because 18th century French universities refused to accept Germain, she sought education elsewhere: she used a man's name to correspond with another mathematician named Gauss. By masquerading as a man, Germain was able to hone her skills and develop her theories, but she couldn't reveal her true identity until *after* she'd proved her genius. In other words, her massive contributions to the field almost weren't recognized as her own, since she initially had to use a man's name. Likewise, Catherine's contribution to math (her brilliant proof) is initially attributed to a man: her own father. When Catherine shows her proof to Hal, he doesn't believe that she could have written it, telling her that, as a mathematician, "[he] know[s] how hard it would be to come up with something like [the proof]." The only person he can imagine who could have written it is Robert, a man. When Catherine tries to make Hal see that she is capable of this level of math, he flatly tells her that "[she] could not have done this

work." Luckily, Hal changes his mind when he reviews the proof with his colleagues, but Catherine's week of despair after Hal refused to believe her sketches an alternate reality: the math community could have credited Robert with the proof, and Catherine would have had no way to prove them wrong. This might have cost her a chance at having a career.

In order to get the credit for their work, the women of *Proof* have to rely on men to believe in their capabilities. Gauss ultimately supported Sophie Germain when he learned her identity; he thought that "she must have the noblest courage, quite extraordinary talents, and superior genius" to have persisted through sexism. Hal also eventually believes in Catherine's genius, but only after he vigorously checks the validity of her claim. This shows an extraordinary barrier to success for women in math: not only does sexism block professional opportunities, but it also can prevent women from getting credit for their accomplishments—all because of cultural assumptions that women aren't very good at math. Both Catherine and Sophie Germain were able to overcome discrimination, but—perversely—only with the help of men.

PROOF, TRUST, AND CREDIBILITY

In the play's opening scene, Catherine and Robert are debating whether Catherine is crazy, and Robert insists that crazy people don't *ask* if they're crazy, so she must be sane. This reasoning seems compelling—until the audience learns that Catherine is currently drinking alone and talking to her dead father, either because she's drunk or hallucinating. This undermines the audience's ability to trust their own eyes: Robert initially seemed to be a flesh-and-blood person, but he's not. It also undercuts Catherine's credibility, since she's seeing things that aren't there. Catherine's credibility later becomes the core issue of the play when she claims to have written the **proof**, and the audience—alongside other characters—must evaluate whether to believe her. Their skepticism is reasonable but damaging, particularly to Catherine's relationship with Hal. Hal doubts Catherine, which makes Catherine doubt Hal, and this wounds them both—but they have to get to a place where they can trust each other again, both for their professional success (getting this proof out into the world) and for their happiness (rescuing their relationship). In the end, just as there's no easy way to write a mathematical proof, there's no shortcut to building credibility with others—people must prove themselves, often over and over, to earn trust.

The play immediately creates an environment of uncertainty, making the audience skeptical—particularly of Catherine. This is most apparent in the opening scene, when a conversation that initially seems like proof of Catherine's sanity—her father reassuring her that "Crazy people don't sit around wondering if they're nuts"—instead makes her seem unstable. Robert turns out to be dead, and Catherine may be hallucinating. In this moment, the audience realizes that they can't trust what they see, and that Catherine's perceptions must be taken with a grain of salt. Catherine's credibility is further diminished when she accuses Hal of stealing one of Robert's notebooks, believing that he plans to publish Robert's work under his own name. This accusation makes Catherine seem unjustifiably paranoid. And even when Catherine *does* find Hal with a notebook, his motives aren't the sinister ones she imagined: he wanted to show Catherine a journal entry that was about her. This exchange deflates Catherine's credibility, but it also shows a human tendency that isn't unique to her: it's easy to misinterpret evidence to support what one already believes.

The play's major crisis of credibility comes when Catherine claims to have written a complex and groundbreaking proof—a claim the other characters doubt. Their skepticism is well-founded. For one, Catherine has very little formal education in math (she took only a few college classes before dropping out to care for her father), but the proof relies on math so complex that only a few people—ones at the top of their field—can parse it. This leads Hal to conclude that Robert probably wrote the proof, not Catherine. Furthermore, Catherine hasn't been the most reliable narrator; by this point in the play, her tendency towards mental illness is well-established, so it seems reasonable to suspect that her claiming authorship of the proof is a grandiose delusion. And one devastating piece of evidence is the handwriting in the proof, which looks like Robert's. This *could* be a coincidence, but when Hal and Claire weigh all of the evidence, it doesn't make sense to trust Catherine. Importantly, Hal remains skeptical of his initial conclusion, and when he and his colleagues investigate the proof, he re-evaluates Catherine's claim. The proof turns out to use mathematical ideas that were developed so recently that Robert wouldn't have understood them, which points to Catherine being its author. Furthermore, Robert dated everything he wrote, but there are no dates in this proof. After weighing this new evidence, Hal is convinced that Catherine *is* the proof's author. While his initial doubt was painful for everyone involved, the process of rigorously weighing the evidence has led him to the right conclusion, vindicating the role of skepticism and evidence.

But even as the play shows the importance of searching for proof, it doesn't overlook the human cost of doubt. Catherine has been miserable throughout the play—her father has just died, her sister is treating her horribly, and she's worried that her life is going nowhere. The only thing that seems to bring her joy is her budding relationship with Hal. But Hal's refusal to take her at her word that she wrote the proof wrecks their relationship and her fragile emotional state. She retreats to her bedroom for a week and, feeling defeated, she agrees to move to New York with her sister. In this, Catherine seems to have lost her spirit—all because she trusted Hal and he broke her trust. And this trust is difficult to rebuild. When Hal returns to

her house confident that she *has* written the proof, it doesn't matter to Catherine—she no longer trusts him, so his belief in her is meaningless. Just as Hal needed to see lots of evidence before he could trust that Catherine wrote the proof, Catherine needs to see lots of evidence in order to trust Hal again. But Hal—a skeptic himself—seems to understand this. In the play's final conversation, Hal apologizes and accepts Catherine's anger. Slowly, the antagonism drains from their conversation and Catherine agrees to walk Hal through her proof. Catherine is still skeptical of him, but he seems prepared to prove himself worthy of her trust.

This process of building trust resembles, in some ways, the process of writing a mathematical proof. In mathematics, one cannot simply *claim* that something is true—instead, one must rigorously demonstrate it, showing through evidence and logic that the initial claim is correct. In her proof, Catherine lays out 40 pages of mathematical argument to prove an elusive idea that many mathematicians believed to be unprovable. And it's standard procedure in math for others to doubt a proof; in order for it to be accepted in the community, many mathematicians must vet a proof, testing it for illogic or inaccuracy. The play suggests that this process of providing evidence and overcoming skepticism is a natural way to build credibility, even outside of the field of math. Trust is *earned* in human relationships, and doubt—however painful it may be—must be slowly overcome.

CARETAKING AND SACRIFICE

By showing how one family deals with crisis, *Proof* explores the value of caretaking. The two sisters of the play, Catherine and Claire, have different ideas about how they should have cared for their late father, Robert. Catherine thought it was best to keep him at home where he was surrounded by the things he loved, even if this meant making personal sacrifices (such as quitting college) to care for him. Claire, on the other hand, believes that Robert would have been "better off" in a mental institution. She thinks that Catherine's sacrifices were unnecessary and that neither of them owed it to their father to put their lives on pause when he got sick. But when Catherine exhibits some of the symptoms of their father's mental illness, Claire wants to be more involved—she tries to force Catherine to move to her home in New York City so that Claire can look after her, and it doesn't seem to matter to Claire that Catherine doesn't want to go. In this way, the sisters embody two different attitudes towards caretaking: Catherine prioritized what her father wanted, whereas Claire believes that she knows what's best for Catherine, even though Catherine disagrees. But the play comes down on Catherine's side: in a journal entry, Robert expresses gratitude that he was able to spend his last years at home, and at the end of the play, Catherine seems to have done the right thing by refusing to go to New York. *Proof* thereby

suggests the importance of listening to the desires of the person who needs care.

In caring for Robert, Catherine puts his needs above her own, which gives him a fulfilling end-of-life. When Robert got sick, Catherine made tremendous sacrifices to do what she thought would be best for him. Instead of institutionalizing him, she dropped out of college and spent her young twenties caring for her father and living with him, putting a damper on her professional ambitions, social life, and independence. But Catherine is certain that this was best for Robert; as she tells Claire at one point, "He needed to be here. In his own house, near the university, near his students, near everything that made him happy." In the end, it seems like Catherine did the right thing. After Robert's death, his former student Hal finds an entry in one of his journals expressing gratitude for Catherine's caretaking. Robert specifically says that "her refusal to let me be institutionalized—her keeping me at home, caring for me herself, has certainly saved my life." And, despite Catherine's tremendous sacrifices for her father, she also seems to benefit from the time she spent caring for him. For one, it made them closer: despite his poor health, she still found that the nights that she spent with him "were usually pretty good." Additionally, caring for Robert gave her time to work on her groundbreaking **proof** after he went to bed each night.

By contrast, Claire doesn't account for Catherine and Robert's desires when she considers how best to care for them. This is clearest in her insistence that both Robert and Catherine would have "better off" had Robert been institutionalized instead of Catherine caring for him at home. Obviously, this isn't what Robert or Catherine wanted, but Claire seems to think it would have been best because it's what would have been easiest for *her*. When Robert got sick, Claire was working long hours and didn't want to sacrifice her life and ambitions to care for her father. Perhaps she feels guilty that she didn't make as selfless a choice as Catherine, or perhaps she genuinely thinks that Catherine's sacrifice made her suffer unnecessarily—but regardless, her presumption about what would have been best for her sister and father seems to disregard their own preferences. Claire does the same thing when she tries to force Catherine to move in with her. Perhaps to Claire this feels selfless (as she's offering to care for Catherine and allow her to live in her home), but Catherine vehemently rejects this idea. She wants to keep her life in Chicago, rather than moving to New York, and she wants to be independent, rather than living with her big sister. Instead of letting Claire dictate her future, Catherine wants to be allowed to "take some time to figure things out" for herself. Ultimately, she is able to seize this freedom—and the play ends with optimistic signs for her career and her relationship with Hal. This suggests that moving to New York wouldn't have been right for Catherine, even if it was convenient for Claire.

Despite their differing approaches, both Claire and Catherine

want to take care of their family members. The difference is that, when Robert needs care, Catherine prioritizes his needs over her own. Claire, on the other hand, tries to care for Robert—and then, later, for Catherine—by making plans for them that are in *her* (as opposed to *their*) best interests. Although Claire feels as though she is helping by intervening, she isn't actually caring for them; she's caring for herself in a difficult situation and disguising it as aiding her family members. Robert's journal entry shows that Catherine's selfless caretaking is the better way to do things—not only did it lead to brief remission, but it also strengthened their bond.

SYMBOLS

Symbols appear in **teal text** throughout the Summary and Analysis sections of this LitChart.

PROOF

QUOTES

Note: all page numbers for the quotes below refer to the Farrar, Straus and Giroux edition of *Proof* published in 2001.

Act One, Scene 1 Quotes

ROBERT: You see? Even your depression is mathematical. Stop moping and get to work. The kind of potential you have—

CATHERINE: I haven't done anything good.

ROBERT: You're young. You've got time.

CATHERINE: I do?

ROBERT: *Yes.*

CATHERINE: By the time you were my age you were famous.

Related Characters: Catherine, Robert (speaker)

Related Themes: (icons)

Page Number: 10

Explanation and Analysis

Robert has just pressured Catherine into calculating the amount of time (translated into days) that she has spent in bed, too depressed to get up. The number that she comes up with—33.25 days—has mathematical significance. His observation, that this coincidence is a sign of Catherine's potential, connects her mathematical genius to her mental illness. Throughout the play, Catherine's mental illness and

her brilliance can't be separated: it appears that she's inherited both from Robert. She writes a ground-breaking proof during a depressive spell, and her periods of instability look similar to her moments of genius and vice versa. This passage supports this theme when Robert points out that Catherine's depression and mathematical talent are so intertwined that her mental illness takes on mathematical patterns. At the same time, it's likely that Catherine wasn't subconsciously regulating her depression so that it fit with certain numerical patterns. It's more likely that the number is random and Robert is making a connection that doesn't really exist. Robert and Catherine have to apply a series of conditions to give the number 33.25 mathematical significance. The implication is that they're seeing something that isn't actually there, a trait that the play associates with madness. At the same time, a unique way of perceiving and interpreting reality is also a sign of genius—after all, both Catherine and Robert make genius contributions to the field of mathematics because they are able to see patterns and find meaning that other people can't.

At this point, though, Catherine isn't convinced that she's inherited Robert's brilliance. In fact, she's anxious that she'll never be as good as Robert, seeing as how, when he was her age, he was already famous for his discoveries. She clearly hopes to inherit his genius but is discouraged that she hasn't "done anything good," or accomplished anything that would put her on par with her father. The audience finds out later, however, that Catherine *has* made significant mathematical discoveries before the age of twenty-five—she has written a historic proof, proving that she is indeed a genius, just like Robert.

CATHERINE: You died a week ago […] You're sitting here. You're giving me advice. You brought me champagne.

ROBERT: Yes.

CATHERINE: Which means…

ROBERT: For you?

CATHERINE: Yes.

ROBERT: For you, Catherine, my daughter, who I love very much…It could be a bad sign.

Related Characters: Catherine, Robert (speaker)

Related Themes: (icons)

Page Number: 13

Explanation and Analysis

At this moment, Catherine—and the audience—realize that the entire conversation that she is having with her father is actually imaginary. Robert died a week ago, so Catherine is either drunk, hallucinating, or missing him so much that she's imagining that he's really there. If she's hallucinating, it could be a sign that she is suffering from mental illness, perhaps inherited from her father.

Even if Catherine isn't actually hallucinating, her imaginary conversation deflates her credibility. The audience suddenly realizes that they can't trust Catherine's perceptions; what they thought was a real conversation was actually all in her head. In order to get the audience to believe her about future claims—including the all-important claim that she wrote an innovative proof—Catherine will need to show evidence. Her word alone cannot be trusted.

This imaginary conversation sets the tone of the play. The audience, who now realizes that they can't trust their own eyes, is now more skeptical of what they see happening onstage. In order to be believed, characters will need to prove the truthfulness of their claims by providing extensive evidence—without evidence, the characters will have a hard time establishing their credibility and getting the audience (and the other characters) to believe them.

❝❞ HAL: […] When your dad was younger than both of us, he made major contributions to three fields: game theory, algebraic geometry, and nonlinear operator theory. Most of us never get our heads around one. He basically invented the mathematical techniques for studying rational behavior, and he gave the astrophysicists plenty to work over too. Okay?

CATHERINE: Don't lecture me.

Related Characters: Catherine, Hal (speaker), Robert

Related Themes: 🧠 ⚜ ⚖

Page Number: 17

Explanation and Analysis

Hal is an enthusiastic admirer of Robert. At this moment, he is praising Robert's genius to Catherine. But Hal comes off as a pretentious and slightly sexist person; he's explaining Robert's accomplishments to Catherine who, as Robert's daughter, is certainly already aware of them. Hal overexplains to Catherine—he enumerates each of the fields that Robert revolutionized as though Catherine wouldn't already know about them. Hal doesn't know

Catherine well, so his "evaluation" of what she knows and doesn't know is likely based on her gender. In overexplaining to Catherine, Hal betrays a common sexist assumption, that women aren't as smart or knowledgeable as men. He doesn't expect Catherine, a woman, to know about the significance of her own father's contributions. Catherine is justifiably annoyed, telling him to stop "lectur[ing] [her]." While Hal doesn't seem to be aware of how condescending he's being, Catherine certainly feels the pains of being stereotyped as less intelligent because of her gender.

Another reason for Catherine's annoyance may be due to the fact that Hal is unknowingly triggering one of her anxieties, that she won't live up to Robert's legacy. Hal bluntly points out that Robert made incredible contributions before he was Catherine's age. Catherine is, of course, already aware of this—it is for this reason that she worries that she hasn't inherited Robert's genius.

Hal's description of Robert's accomplishments reveals an important aspect of Robert's genius: he perceives things that other people don't. Throughout the play, both genius and madness are characterized by the tendency to interpret and perceive the world in a way that is unfamiliar to others. In this instance, Robert's ability to see the world in a unique way is what allows him to make these ground-breaking discoveries. While "Most [people] never get [their] heads around one" field of mathematics, Robert is able to understand multiple. His discovery of new "mathematical techniques" suggests that what is intuitive or apparent to him is novel for others.

❝❞ HAL: […] "Talking with students helps. So does being outside, eating meals in restaurants, riding buses, all the activities of 'normal' life. Most of all Cathy. The years she has lost caring for me […] her refusal to let me be institutionalized—her keeping me at home, caring for me herself, has certainly saved my life. Made writing this possible. Made it possible to imagine doing math again […] I can never repay her."

Related Characters: Robert, Hal (speaker), Catherine

Related Themes: 👫

Page Number: 23

Explanation and Analysis

Hal is reading aloud a journal entry that Robert had written during his period of lucidity. Robert credits Catherine's care for his remission; enjoying "all the activities of 'normal' life"

are what help his mental health improve. In-home caretaking has made that possible—had Robert been in an institution, he would have been kept away from these "normal" day-to-day activities.

Later in the play, Claire argues that her idea—institutionalizing Robert—would have been better for him. While institutionalizing him would have been more convenient for *her*, Robert's entry explicitly refutes her claim. He says that Catherine's "refusal to let [him] be institutionalized […] has certainly saved [his] life" and brought on his remission. In this way, Robert's journal entry makes it clear that, when caring for others, it is necessary to listen to and heed the desires of the people being cared for.

Act One, Scene 2 Quotes

💬 CLAIRE: Did you use that conditioner I bought you?

CATHERINE: No, shit, I forgot.

CLAIRE: It's my favorite. You'll love it, Katie. I want you to try it. […] It has jojoba […] It's something they put in for healthy hair.

CATHERINE: Hair is dead […] It's dead tissue. You can't make it healthy.

CLAIRE: It makes my hair feel, look, and smell good. That's the extent of my information about it. You might like it if you decide to use it.

Related Characters: Catherine, Claire (speaker)

Related Themes: 👫

Page Number: 24-25

Explanation and Analysis

This interaction, which takes place right after Claire arrives in Chicago for Robert's funeral, captures Claire's pushiness when she tries to help other people. At first glance, Claire's actions seem helpful: she has given her sister a practical yet luxurious gift. But it quickly becomes clear that fancy conditioner isn't something that Catherine is interested in. She even flatly tells Claire that the jojoba that Claire praises is superfluous, given that hair is "dead tissue" so "You can't make it healthy."

Claire then explains why she gave Catherine the gift—the conditioner works for her (Claire), so she assumes that Catherine will also enjoy it. Claire wasn't thinking of Catherine's interests when she was picking out the gift. Claire was thinking of her own interests and assuming that Catherine would feel the same way about them. Claire demonstrates this same self-first thinking in her caretaking.

Instead of listening to the desires of the people she is supposed to care for—Robert and then Catherine—she makes plans that are most convenient for herself and then says that she's helping them. It even seems like Claire really believes that she is being helpful, which speaks to how easy it is for people to convince themselves that they are helping others when, in reality, they're really just helping themselves.

Act One, Scene 3 Quotes

💬 CATHERINE: […] Later a mutual friend told [Gauss] the brilliant young man was a woman.

He wrote to her: "A taste for the mysteries of numbers is excessively rare, but when a person of the sex which, according to our customs and prejudices, must encounter infinitely more difficulties than men to familiarize herself with these thorny researches, succeeds nevertheless in penetrating the most obscure parts of them, then without a doubt she must have the noblest courage, quite extraordinary talents, and superior genius."

(Now self-conscious) I memorized it…

Related Characters: Gauss, Catherine (speaker), Sophie Germain

Related Themes: ⚖️

Page Number: 36

Explanation and Analysis

In response to a sexist remark, Catherine tells Hal about a woman—Sophie Germain—who overcame many discriminatory obstacles to become a renowned mathematician. For example, universities refused to accept her because she was a woman. To further her career, she used a male pseudonym to write to another mathematician by the name of Gauss. It was highly probable that a male mathematician wouldn't take her seriously if he knew she were a woman—according to sexist cultural attitudes (then and now), women are not as smart as men. These sexist attitudes are still alive; after all, Hal *just* used male descriptors to describe mathematicians, demonstrating that he, albeit subconsciously, thinks of math as a man's field of study.

The fact that Catherine has memorized Gauss's letter to Sophie Germain suggests that she sees parallels between herself and Germain. Both are female mathematicians in a male-dominated field. Many of the statements in Gauss's letter still hold true: because of current sexist "customs and

prejudices," women still "encounter infinitely more difficulties than men" when they try to make a name for themselves in the field of mathematics. This is true for Catherine, who has already experienced sexist discrimination at the hands of Hal, who has condescended to her about her abilities on multiple occasions and, later, even rejects the possibility that Catherine has the brilliance needed to write the proof that she claims to write.

Because women face so many more obstacles than men when trying to pursue opportunities in the field of mathematics, the women who do manage to accomplish great things must be even more persistent—and perhaps more intelligent—than the average man. Gauss makes this argument in his letter when he says that a woman who "succeeds nevertheless in penetrating the most obscure parts of [mathematics] […] must have the noblest courage, quite extraordinary talents, and superior genius." Essentially, women have to work harder and be smarter than their male counterparts in order to gain any respect for their talent.

Act One, Scene 4 Quotes

🔖 CATHERINE: I know you mean well. I'm just not sure what I want to do. I mean to be honest you were right yesterday. I do feel a little confused. I'm tired. It's been a pretty weird couple of years. I think I'd like to take some time to figure things out.

CLAIRE: You could do that in New York.

CATHERINE: And I could do it here.

CLAIRE: But it would be much easier for me to get you set up in an apartment in New York, and—

CATHERINE: I don't need an apartment, I'll stay in the house.

CLAIRE: We're selling the house.

Related Characters: Claire, Catherine (speaker)

Related Themes: 🔧 👫

Page Number: 42-43

Explanation and Analysis

This conversation takes place the morning after the party. Catherine begins the conversation in a good mood—she has just spent the night with Hal and, believing that she can trust him, has told him how to find her mathematical proof. It appears that her budding relationship with Hal has inspired her to be honest with Claire; in other words, by proving to Catherine that he can be trusted, Hal serves as

evidence that there are people who will believe in and respect her. Now that Catherine is feeling more confident, she is willing to open up to Claire. Catherine's previous interaction with Claire was antagonistic, with Catherine being sarcastic and reluctant to be honest with her sister. Catherine has good reason to be hesitant with Claire, seeing as how Claire doesn't respect Catherine's wishes and even doubts the validity of everything that Catherine says. But now Catherine is honest with Claire, telling Claire that she "feel[s] a little confused" and wants to "take some time to figure things out."

But Claire immediately dismisses Catherine's wishes. Claire already has plans for Catherine's future, and they benefit Claire the most. Moving Catherine to New York is the most convenient option for Claire. As she tells Catherine, "it would be much easier for me to get you set up in an apartment in New York." This comment reveals an important aspect of Claire's approach to caretaking: she makes plans that are most convenient for herself, and then she pretends they're what's best for the person she's supposed to be helping. Claire doesn't consider Catherine's preferences at all when making a plan for how to take care of her sister—Claire even sells the house Catherine is living in without telling her. While Claire may "mean well," she's going about things the wrong way, making Catherine even more upset when she's already in an emotionally fragile place.

🔖 CLAIRE: Living here with him didn't do you any good. You said that yourself.

You had so much talent…

CATHERINE: You think I'm like Dad.

CLAIRE: I think you have some of his talent and some of his tendency toward…instability.

Related Characters: Catherine, Claire (speaker), Robert

Related Themes: 🧠 ⚛️ 👫

Page Number: 45

Explanation and Analysis

Claire has just told Catherine that she thinks that things would have been better for both Robert and Catherine had Robert been institutionalized. At this point, the audience knows that Claire is wrong—Robert's journal entry explicitly stated that Catherine's caring for him at home is what led to his remission. Although Claire (presumably) doesn't know about Robert's journal entry, it's possible that she suspects

that Catherine did the right thing by giving up her life to care for their father. Instead of admitting her fault, Claire insists that institutionalization would have been better, possibly because she feels guilty for not being selfless. Maybe this is why Claire stresses that Catherine would have been better off had Robert been institutionalized—while there is no evidence that Robert was worse off at home than in an institution, it's easier for Claire to argue that Catherine was negatively affected from in-home caretaking than Robert was. After all, Catherine's mental health has been poor.

Claire's insistence that institutionalization would have been better for Catherine hinges on the assumption that Catherine's mental health was negatively affected by her environment, and not just by her genes. The implication is that family shapes a person through proximity, and not just through genetic inheritance—Catherine is showing signs of mental illness not solely because she inherited it from Robert, but because the stress of caring for him exacerbated her instability.

At the same time, Claire does imply that genetics are still at work. She thinks that Catherine has "some of [Robert's] talent and some of his tendency toward…instability." Consistent with the rest of the play, genius doesn't come without madness, and vice versa. It appears that, for Catherine and Claire's family, brilliance and mental instability are inextricable from each other—Catherine can't inherit one without inheriting the other.

Act Two, Scene 1 Quotes

🙿🙿 ROBERT: […] I'm not doing much right now. It does get harder. It's a stereotype that happens to be true, unfortunately for me—unfortunately for you, for all of us.

CATHERINE: Maybe you'll get lucky.

ROBERT: Maybe I will. Maybe you'll pick up where I left off.

CATHERINE: Don't hold your breath.

ROBERT: Don't underestimate yourself.

Related Characters: Catherine, Robert (speaker), Hal

Related Themes: 🧬

Page Number: 57

Explanation and Analysis

Hal is visiting Robert to give him his dissertation and asks Robert if he has been doing any work during his remission. Robert isn't doing any work at the moment. He is feeling the

effects of aging—creative thinking doesn't come as naturally as it did when he was younger. As he tells Hal, losing one's capabilities is an unfortunate fact of growing old. So while he can't work, Robert finds comfort in knowing that Catherine may follow in his footsteps and accomplish the things he wished he could. As he tells her, he hopes that she will "pick up where [he] left off." In this sense, heredity benefits the parents in a family—parents can "live on" through their children when their children carry on their legacy.

Catherine is not as confident as Robert is. She wants to inherit Robert's genius but fears that she won't. While Robert was famous by the age of 25, Catherine (at this point of the play) hasn't even had the chance to go to college. Her anxieties surrounding her inferiority have a considerable effect on her. Throughout the play, Catherine seems to lack confidence in herself: she constantly second-guesses her sanity and her abilities and, when she does make a groundbreaking discovery, she hides it. Instead of publishing the proof on her own, Catherine is hesitant to show the proof to anyone, which implies that she doesn't feel confident enough to advocate for herself and go through the publishing process alone. In this way, the play shows how family shapes a person—not just through genes, but through environment as well. In Catherine's case, she acts upon her fear that she won't live up to her father's legacy.

Act Two, Scene 2 Quotes

🙿🙿 CLAIRE: […] You wrote this incredible thing and you didn't *tell* anyone?

CATHERINE: I'm telling you both now. After I dropped out of school I had nothing to do. I was depressed, really depressed, but at a certain point I decided, Fuck it, I don't need them. It's just math, I can do it on my own. So I kept working here. I worked at night, after Dad had gone to sleep. It was hard but I did it. […]

CLAIRE: Catherine, I'm sorry but I just find this very hard to believe.

Related Characters: Catherine, Claire (speaker), Robert

Related Themes: 🧠 🤝

Related Symbols: 🔣

Page Number: 60-61

Explanation and Analysis

Catherine has just told Claire and Hal that she wrote the proof. At this point, Claire, Hal, and the audience hesitate to believe that Catherine really wrote the proof. The play has already established Catherine's tendency toward mental instability, so Claire, Hal, and the audience themselves are justified in their skepticism. Catherine could be lying—she may see this proof as her chance to gain fame and thus live up to Robert's legacy—or she may be delusional. Both are tempting theories with evidence to support them: Catherine has expressed her fears about living in her father's shadow, she hasn't had much formal education, and she has symptoms (like hallucinations) of a severe mental illness. Catherine doesn't have much credibility, so simply claiming that she wrote the proof isn't enough. Catherine needs to provide abundant evidence to support her claim that she is the proof's author.

Eventually, Hal and the audience realize that Catherine is indeed the author of the proof. This makes Catherine a genius—she was able to accomplish something that mathematicians have been wanting to prove for centuries. Not only did Catherine write this historic proof, but she also taught herself the complex math needed to get there. She is clearly extraordinarily brilliant. It's important to note that Catherine completed this work of genius during a period of depression, which means that her brilliance is inextricable from her mental illness. One of the play's arguments is that genius and madness are both characterized by a tendency to interpret and perceive reality in a unique way. By intertwining Catherine's moment of genius with a period of mental illness, the play suggests that it is because people who undergo mental instability experience the world in a different way that they are able to discover and create such astounding things.

> 💬 HAL: I'll tell them we've found something, something potentially major, we're not sure about the authorship; I'll sit done with them. We'll go through the thing carefully […] and figure out exactly what we've got. It would only take a couple of days, probably, and then we'd have a lot more information. […]
>
> CATHERINE: You can't take it …] You don't waste any time, do you? No hesitation. You can't wait to show them your brilliant discovery.
>
> HAL: I'm trying to determine what this is.
>
> CATHERINE: I'm telling you what it is.
>
> HAL: You don't know!
>
> CATHERINE: *I wrote it.*

Related Characters: Catherine, Hal (speaker)

Related Themes: ⚖️ 🧠

Related Symbols: 🔢

Page Number: 63

Explanation and Analysis

Neither Claire nor Hal believe that Catherine wrote the proof. Hal suspects that Robert is the author, but he isn't satisfied with simply theorizing—he wants evidence to prove his claim. To Hal, providing evidence is necessary when arguing the truthfulness of something. Like in a mathematical proof, Hal knows the importance of gathering evidence to prove a claim. Just saying something is true is meaningless—there need to be facts supporting the statement as true. This is exactly what Hal plans to do with the proof; he's going to work with experts to analyze the proof for signs of who wrote it.

Catherine is hurt by Hal's skepticism, which appears to be motivated—at least in part—by Hal's internalized sexist assumption that women are not as smart as men. Hal's determination to rigorously analyze the proof seems to suggest that he's relatively open minded—he refuses to simply accept claims and requires evidence in order to believe something. And yet he refuses to believe that it's possible that Catherine wrote the proof, even denying her the chance to demonstrate her knowledge by explaining the proof to him. He knows very little about Catherine, so his "evaluation" of her capabilities is based on what he does know—her gender.

Fear of further sexist discrimination is likely what's making Catherine afraid that Hal is trying to steal her idea. When Hal suggests that he borrow the proof to analyze it with other male colleagues, Catherine is immediately afraid that he is going to try to pass the proof off as his own "brilliant discovery." Her experiences with Hal (and likely other "off-stage" experiences as well) have taught her that men do not readily believe that women can possess the genius that they eagerly attribute to men. If Hal were to present the proof as his own, it is very likely that he would be believed. Meanwhile, who would believe that a female college drop-out could write such an innovative proof? Even her sister doesn't believe her. Sexist cultural attitudes threaten Catherine's chance at getting recognized for her work.

❝❞ HAL: I'm a mathematician [...] I know how hard it would be to come up with something like this. I mean it's impossible. You'd have to be...you'd have to be your dad, basically. Your dad at the peak of his powers.

CATHERINE: I'm a mathematician too.

HAL: Not like your dad.

CATHERINE: Oh, he's the only one who could have done this?

HAL: The only one I know.

Related Characters: Catherine, Hal (speaker), Robert

Related Themes: 🔵 🔴

Related Symbols: 🔵

Page Number: 64

Explanation and Analysis

Catherine tries to convince Hal that she wrote the proof, but he keeps insisting that Robert, not Catherine, is the author. In this passage, Hal is condescending toward Catherine. He tells her that he knows how hard it would be to write the proof because he's a mathematician, thereby implying that she isn't a mathematician and is therefore ignorant of the complexity of the proof. When Catherine reminds him that she's "a mathematician too," he dismisses her claim by saying that she's "Not like [her] dad." Of course, Hal isn't like Robert either—he isn't famous for revolutionizing several fields of mathematics—so his insistence that Claire isn't a mathematician probably has less to do with the fact that she's not as famous as Robert and more to do with the fact that she's a woman. And because Hal has more credibility than Catherine in the mathematical community, his dismissal of Catherine could lead to Robert getting credit for the proof. His sexist assumptions jeopardize Catherine's chance at being recognized for her work.

But Catherine, not Robert, is the real author of the proof. Catherine has been nervous that she hasn't inherited her father's genius, but now, in a perverse twist of fate, Catherine's work is getting confused with her father's. It appears that she *has* inherited his brilliance after all—so much so that people can't tell her work apart from his.

Act Two, Scene 3 Quotes

❝❞ CLAIRE: [...] I probably inherited about one one-thousandth of my father's ability. It's enough.

Catherine got more, I'm not sure how much.

Related Characters: Claire (speaker), Catherine, Robert

Related Themes: 🔵 🔵

Page Number: 68

Explanation and Analysis

Claire has just asked Hal to explain the proof to her, and Hal wants to know how much math knowledge she has. Claire has "inherited about one one-thousandth of [Robert's] ability." On the other hand, it also seems like Claire hasn't inherited Robert's mental instability. Throughout the play, Claire is emotionally stable and level-headed, especially in comparison to Catherine, who also got more of Robert's ability. So, while Catherine inherited both Robert's genius and his mental illness, Claire got neither. The implication is that, at least in Claire and Catherine's family, genius and madness are inextricable—one trait doesn't come without the other.

It's also possible that Catherine's similarity to Robert—and Claire's dissimilarity to him—isn't just limited to genetics. The play makes it clear that Claire isn't very close with Robert, especially in comparison to Catherine. Whereas Catherine moved in with Robert to take care of him throughout his long illness, Claire lived in a different city, pursuing her own career away from her family. Catherine may be similar to Robert not just because of genetics, but because of their close relationship. This would help explain why Claire, who is also related to Robert, isn't very much like her father—Robert didn't have much influence on her because they didn't spend much time together.

Act Two, Scene 4 Quotes

❝❞ CATHERINE: "[...] In September the students come back and the bookstores are full. Let X equal the month of full bookstores. The number of books approaches infinity as the number of months of cold approaches four. I will never be as cold now as I will in the future. The future of cold is infinite. The future of heat is the future of cold. The bookstores are infinite and so are never full except in September..." [...] It's all right. We'll go inside.

ROBERT: I'm cold.

CATHERINE: We'll warm you up.

ROBERT: Don't leave. Please.

CATHERINE: I won't. Let's go inside.

Related Characters: Robert, Catherine (speaker)

Related Themes:

Page Number: 74

Explanation and Analysis

This passage takes place in a flashback to four years before Catherine shows Hal and Claire her proof. In this scene, Catherine visits Robert because he's stopped answering her calls. When she sees him, he's writing in notebooks and telling her that his mind is working again, and he's writing a proof he wants her to see. Until this moment, when Catherine reads the notebook, neither she nor the audience know whether Robert is in a period of genius or is slipping into madness. Brilliance and mental instability look a lot like each other in the play, an ambiguity that the play exploits in this scene. The audience realizes that Robert is experiencing and perceiving the world in a different way than the average person, but they don't know if it's because he's delusional or because he's experiencing a stroke of brilliance.

Once Catherine reads the notebook aloud, it's clear that Robert is actually descending into madness. The connections and interpretations that he is making—like "The future of heat is the future of cold," and "The bookstores are infinite and so are never full except in September"—are incoherent and nonsensical.

Now that Catherine knows that her father is ill again, she needs to make a decision about how to care for him. Having already taken care of Robert for years, she knows that caring for him means that she'll have to give up her social life and her academic career. But when Robert begs her "Don't leave. Please," she listens and respects his wishes. She promises that she will care for him and, as the play demonstrates, she fulfills this promise, taking care of him until the end of his life. For Catherine, caring for family means respecting their wishes and supporting them how they wish to be supported.

Act Two, Scene 5 Quotes

💬 HAL: [...] Your dad dated everything. Even his most incoherent entries he dated. There are no dates in this.

CATHERINE: The handwriting—

HAL: —looks like your dad's. Parents and children sometimes have similar handwriting, especially if they've spent a lot of time together.

Related Characters: Catherine, Hal (speaker), Robert

Related Themes:

Related Symbols:

Page Number: 80

Explanation and Analysis

After analyzing the proof with several colleagues, Hal believes that Catherine is the author. At this moment, the play appears to vindicate the role of skepticism and evidence. Hal was skeptical of Catherine's claim, but he also remained skeptical of his own theory that Robert wrote the proof, so when he found evidence (such as how the proof has no dates, whereas Robert dated everything) that supported Catherine's claim, he changed his mind. It is because Hal rigorously analyzed evidence that he was able to come to the right conclusion—that Catherine is the author—all while collecting evidence that she can use to prove her claim in the future.

Now that Hal has analyzed more evidence, he realizes that one piece of evidence—the handwriting that looks like Robert's—has a different significance than he once thought; rather than disproving Catherine's claim that she wrote the proof, it's evidence of how close she and her father were. The implication is that one should always gather as much information as possible, because some evidence may be misleading. After studying other factors, such as the newer techniques and the lack of dates, Hal realizes that the handwriting's similarity to Robert's isn't a sign that Robert wrote the proof. It actually signifies the closeness of Robert and Catherine's relationship. As Hal tells Catherine, "Parents and children sometimes have similar handwriting, especially if they've spent a lot of time together." Catherine lived with Robert for years. It appears that handwriting is just one more way that Robert influenced Catherine. The similarity in handwriting also symbolizes how genes aren't the only way that a parent can shape their child—environment and close relationships are also factors in a child's development.

HAL: Come on, Catherine. I'm trying to correct things.

CATHERINE: You *can't*. Do you hear me?

You think you've figured something out? You run over here so pleased with yourself because you changed your mind. Now you're certain. You're so…*sloppy*. You don't know anything. The book, the math, the dates, the writing, all that stuff you decided with your buddies, it's just evidence. It doesn't finish the job. It doesn't prove anything.

HAL: Okay, what would?

CATHERINE: *Nothing*.

You should have trusted me.

Related Characters: Catherine, Hal (speaker)

Related Themes:

Related Symbols:

Page Number: 80-81

Explanation and Analysis

Hal has just told Catherine that, now that he has analyzed evidence and evaluated her claim, he believes that she's the author of the proof. On one hand, the play validates the role of skepticism and evidence, because Hal came to the right conclusion through rigorous analysis. But Hal's skepticism comes at a cost. When Hal refused to believe Catherine, he broke her trust and destroyed their relationship. While he is "so pleased with [him]self because [he] changed [his] mind," she is unmoved because the damage is already done. As she tells him, "The book, the math, the dates, the writing, all that stuff [he] decided with [his] buddies, it's just evidence […] It doesn't prove anything." He may have evidence that supports Catherine's claim, but none of it proves that he believes in her and supports her. Their relationship is ruined because she can't trust him to support her in the future. If he had trusted her word, she would have known that she could rely on him; his believing her would have been the proof she needed to know she could trust him.

The process of building trust is like the process of writing a mathematical proof. In both instances, a claim must be supported with evidence. In a relationship, each person must prove that they can be trusted. One way a person can do this is by showing that they believe the other person. Catherine's showing Hal the proof was evidence that she trusted him. When Hal didn't believe her, she lost her faith in him. Now that Hal is back and asking her to trust him again (he wants her to tell him more about the proof), Catherine is reluctant to do so—there is no evidence that he

is trustworthy. Trust is difficult to rebuild, which Catherine makes clear when she tells him that "*Nothing*" will fix their relationship. As she says, "[he] should have trusted [her]."

HAL: There is nothing wrong with you.

CATHERINE: I think I'm like my dad.

HAL: I think you are too.

CATHERINE: I'm…*afraid* I'm like my dad.

HAL: You're not him.

CATHERINE: Maybe I will be.

HAL: Maybe. Maybe you'll be better.

Related Characters: Catherine, Hal (speaker), Robert

Related Themes:

Page Number: 82

Explanation and Analysis

After Catherine angrily tells Hal that there's nothing he can do to fix their broken relationship, Hal begins to give her evidence that he's committed to at least trying to rebuild her trust in him. He does this by showing that he's still interested in her (he tries to convince her to stay in Chicago instead of moving away) and by addressing her anxieties surrounding her father. Throughout the play, Catherine fears that she is doomed to become mentally unstable like Robert, while also fearing that she hasn't inherited Robert's genius. Hal comforts her by reminding her that she is not destined to be like Robert and by expressing confidence in her abilities. As he tells her, she is "not him […] Maybe [she]'ll be better."

Hal begins by assuring Catherine that he doesn't think she's mentally unstable, telling her that "There is nothing wrong with her." Catherine clearly needs this vote of confidence—throughout the entire play, she has been afraid that she is going to become mental unstable, just like her father. On top of her own fears, her sister Claire is certain that Catherine is delusional and needs immediate care. Hal's confidence in her comes at a much-needed moment and it builds his credibility with her.

Hal's comment that "Maybe [she]'ll be better" refers to both her mental health and her mathematical talent. He knows that Catherine's genius makes her similar to her father, but he also believes that she is her own person, not just a replica of Robert. After all, her groundbreaking mathematical proof was in a distinctly individual style, which is what proved to Hal that the proof was hers and not Robert's. Hal believes

Catherine may be "like [her] dad," but she isn't fated to be exactly like him, both in terms of her mental health and in her career. Hal voices exactly what Catherine has been craving to hear throughout the play—she's not destined to be mentally unstable, and she can live up to (and perhaps outperform) her father's legacy—which is likely why she gives him another chance at building a relationship with her. The play ends with her agreeing to go over the proof with Hal, signifying their renewed attempt to build a relationship.

SUMMARY AND ANALYSIS

The color-coded icons under each analysis entry make it easy to track where the themes occur most prominently throughout the work. Each icon corresponds to one of the themes explained in the Themes section of this LitChart.

ACT ONE, SCENE 1

Exhausted, Catherine sits in a chair on the back porch of a house in Chicago. Her father, Robert, stands behind her, but she doesn't realize that he is there. It's nighttime, and both she and her father are rather messily dressed. Suddenly, he asks Catherine if she can't sleep, startling her.

Catherine's exhaustion and her haphazard outfit suggest that she is going through a hard time. Robert is also messily dressed, which may suggest that he also doesn't have the time or energy to care about what he's wearing. The fact that Catherine and Robert are alike in their haphazard dress may suggest that the two characters are similar to each other in some unspecified way, but, at this point, the audience doesn't know what this similarity would be.

When Catherine asks Robert why he's there, he says he's "check[ing] up" on her. Catherine is waiting for his student, who's upstairs in Robert's office, to leave. Robert reminds Catherine that the man is no longer his student, but a teacher in his own right.

In this passage, Catherine comes off as a bit confused. She's clearly surprised by Robert's presence, which may suggest that he's not supposed to be on the porch at all, or it may mean that he should be asleep (it's late at night). She also mistakenly identifies the man in the house as her father's student (he's actually a teacher now), which may indicate that she's not up to date with what's going on around her. In general, Catherine seems to be out of sorts. Catherine's confusion establishes an atmosphere of uncertainty, making the audience feel unsure of what's going on.

Since it is past midnight, Robert gestures toward a bottle of champagne while wishing Catherine a happy birthday. As she pops open the bottle, she says that she feels old—she's twenty-five years old. Robert forgot to bring glasses, so Catherine takes a swig from the bottle then pronounces the wine disgusting. Not insulted, Robert says that he's proud to not be a wine snob, as he finds "those kind of people" to be annoying. Catherine offers Robert some of the wine, but he declines.

Robert and Catherine appear to have a close and amicable relationship. Catherine feels comfortable enough with him to drink straight from the bottle in front of him and, when she pokes fun at Robert's poor wine choice, he isn't offended, but instead joins in the gentle teasing. Catherine shows that she has some anxieties about getting older (she isn't happy that she's turning twenty-five), although the audience doesn't know why yet.

Robert asks Catherine what she will be doing on her birthday, and she says that she'll be drinking the wine he purchased. He asks whether her friends will celebrate with her, but Catherine tells him no; she doesn't have any friends. When Robert brings up an old friend of hers, Catherine exclaims that the girl, Cindy Jacobson, was her friend in the third grade. Robert asks about Claire, which Catherine dismisses. Claire doesn't count because she is Catherine's sister, whom Catherine doesn't even like.

Robert is now the one who seems behind-the-times—he thinks that Catherine is close to someone that she hasn't seen since childhood. The fact that Robert doesn't know some key details about Catherine's life (he doesn't know she doesn't have friends or that she doesn't like her sister) seems at odds with the fact that they seem to be quite close. This confusion adds to the general atmosphere of uncertainty. Additionally, Catherine's not having friends suggests that she either is an unfriendly person or that she doesn't have the time, energy, ability, or inclination to make friends. Again, the audience doesn't know why. Another important fact about Catherine is that she isn't close to her sister, which Robert again seems ignorant of. This implies that there may be a rift in the family; while Catherine and Robert are close, Claire doesn't seem to be in the picture as much.

Confused, Robert says that he thought that Claire was coming. But Catherine explains that Claire is arriving the next day. After a moment, Robert advises Catherine to do some math, as that's what helps him when he's up late. But Catherine refuses and instead offers him some wine, which he declines again. He reminds Catherine of her talent—she "knew what a prime number was before [she] could read"—and tells her that, while she is going through a rough time, she shouldn't be lazy.

Claire's absence is confirmed in this passage—she doesn't live with Robert and Claire, and her trips to visit are planned, which shows that she isn't close enough (emotionally or geographically) to casually stop by unannounced. Meanwhile, Robert's advising Catherine to do math—it's what helps him when he's up late—shows his love for math. By refusing, Catherine appears to not be as interested in math, but it becomes clear that that's not because she has no talent for it—according to Robert, Catherine has had a talent with numbers since a young age. Robert also reveals that Catherine has been going through a rough period, which could explain the exhaustion and confusion that she has exhibited so far. The reason that Catherine is in a bad place is unclear.

Catherine insists that she's not lazy—she's been busy taking care of Robert. But Robert enumerates her bad habits: she sleeps late, eats poorly, doesn't work, doesn't clean, and rarely gets out of bed. Catherine makes a joke, but Robert won't let it go, bluntly telling her that she has wasted many days, which means that she's also lost any groundbreaking ideas that she could have had during that time.

Catherine's exhaustion may be due to the fact that she's been caring for her father. All the same, Robert believes that Catherine has been lazy and isn't living up to her potential. His insistence that she is mathematically talented suggests that Catherine is either extremely talented, or Robert just thinks she is. At the same time, Catherine is clearly struggling with her mental health; all of the "bad habits" that Robert references can actually be interpreted as signs that her mental health is poor. So, Catherine may be brilliant, and she may be living with poor mental health.

When Catherine admits that she has "lost a few days," Robert sharply asks how many—he knows that she counts them. Catherine claims not to keep track, but Robert keeps pushing, and she finally admits that she's lost 33 days plus a chunk of today, which is a "depressing [...] number."

Not only is Catherine's mental health so poor that she has spent more than 33 days' worth of time too depressed to get out of bed, but she is so intuitive with math that she keeps track of the time she has spent holed up in her room. She easily calculates the amount of time she has "lost" to her mental illness, which supports Robert's belief that she has a talent for math.

But Robert says that if each day were a year, the number would be quite interesting. Catherine reluctantly acknowledges that it would be 1729 weeks, which is "The smallest number expressible [...] as the sum of two cubes in two different ways." Delighted, Robert proclaims that "Even [her] depression is mathematical," taking it as a sign of her potential.

Catherine's mathematical talent seems even more apparent in this passage, in which she performs some impressive calculations on the spot. Robert interprets the coincidence—the number of days that she "wasted" is a mathematically significant number—as a sign of Catherine's potential. But his remark that "Even [her] depression is mathematical" has a greater thematic meaning—it suggests that Catherine's mental illness to is inseparable from her brilliance.

Catherine feels that she hasn't "done anything good," particularly in comparison to Robert, who was already famous when he was her age. He confirms that by 25, he'd already done his best work. After a pause, Catherine reminds him that he couldn't work after he got sick. But Robert insists that he was at his sharpest then, which makes Catherine laugh.

Catherine's anxieties about getting older are partially explained: she's worried that she won't live up to her father's legacy. While she feels that she hasn't made any discoveries or contributions (presumably to the field of mathematics), Robert had already done a considerable amount of work that had made him famous by the time he was her age. Apparently, his successful period was cut short when he became sick—this sickness may also be the reason that Catherine has been taking care of him.

Robert felt an amazing clarity after getting sick, and Catherine asks whether he was happy then. He says yes—he was "busy." Catherine points out that busy and happy aren't the same, but Robert "[doesn't] see the difference." He would work all day and find "secrets, complex and tantalizing messages" all around him.

Robert is obsessed with his work—to him, being busy is the same thing as being happy. For Robert, working feels like finding "secrets, complex and tantalizing messages," a description that suggests that his brilliance is tied to his ability to perceive connections and meaning that are "secret," or unseeable, to other people.

Catherine abruptly asks when "it" started. As Robert explains that he was in his mid-twenties, he realizes that this is what Catherine may be dreading this year; she's afraid to go "bughouse" like he did. But he says that there are lots of factors beyond heredity—just because he got sick doesn't mean she will.

This passage partially explains Robert's illness, as well as why Catherine is anxious about turning twenty-five. Robert evidently became ill with a severe mental illness, which is likely the reason that Catherine has been taking care of him. Robert's sickness set in around Catherine's age, giving her another reason to feel stressed about her birthday—not only does she feel unaccomplished when compared to Robert, but she's also worried about inheriting his mental illness.

Robert reassures Catherine that she's just going through a rough spot and, if she just "get[s] the machinery going" again, everything will be fine. He adds that the mere fact that she is talking to him about this is a good sign, since "Crazy people don't sit around wondering if they're nuts"—and he would know.

Just as Robert is convinced that Catherine has inherited his mathematical talent, he is certain that she hasn't inherited his mental instability. To comfort her, he gives her a seemingly good argument, that "Crazy people don't sit around wondering if they're nuts." As someone who has experienced mental illness, he seems to be a credible source.

Catherine seems to believe Robert, but then she interrupts him: his argument doesn't make sense. He just called himself "crazy," even though he also said that "a crazy person would never admit that." Robert replies that he can only admit it because he's dead, which Catherine confirms: he died from heart failure a week ago, and Claire is coming to Chicago for the funeral. Catherine asks what it means for her that she's talking with her dead father, and Robert replies that it might be a bad sign.

Robert's argument crumbles with the revelation that he's actually dead—Catherine is either drunk, hallucinating, or missing him so much that she is imagining that he's there. But this moment severely undercuts Catherine's credibility. The audience suddenly realizes several things: one, Catherine may not be a reliable witness; two, maybe she really has inherited Robert's mental instability; and three, the audience cannot trust what they see, since Robert appeared to be a flesh-and-blood person but is actually a figment of Catherine's imagination.

Hal enters the room, startling Catherine. As he apologizes for staying so late, Robert disappears. Noticing Catherine's champagne bottle, Hal asks whether she is drinking alone. She says yes and offers him the bottle, but he says he needs to drive. When he asks if he can come back tomorrow, Catherine reminds him about the funeral. Apologetic, Hal asks whether he can come Sunday.

When Hal enters, Robert disappears, which confirms that Robert isn't actually there, and that Catherine had only imagined that him. Now that Robert is no longer there, Catherine's drinking takes on a more somber significance. She's drinking on her own, which can be a sign of poor mental health.

Incredulous, Catherine asks how much more time Hal needs; he has already had three days. But Hal says he'll need at least another week to go through everything in the office. So far, he's been sorting the notebooks—Robert dated them all. But when Hal suggests that he bring the books home, Catherine refuses. According to her, he's just wasting his time, as the books contain nothing but nonsense—Robert was a graphomaniac, which means he wrote compulsively. But Hal insists that someone has to look through all 103 notebooks that Robert left behind to make sure that there isn't anything genius.

Hal, who is Robert's former student (the one mentioned at the beginning of the play), demonstrates that he is a rigorous and pushy person. He is a dedicated mathematician who wants to know for a fact whether Robert's notebooks only contain gibberish. By painstakingly going through each notebook, Hal demonstrates his skepticism and a belief in the supreme value of evidence. He isn't just going to take Catherine's word that there's nothing valuable in the books—he's going to look in each one in order to have definitive proof of whether Robert only wrote nonsense. At this point, the audience may support Hal's skepticism toward Catherine, given that Catherine is not the most reliable character (she just hallucinated her dad's presence). At the same time, his refusal to take Catherine at her word doesn't make her inclined to be kind to him.

Hal tells Catherine that he has to go see some friends from the math department play in a band. Their songs are math jokes, including one called "i," or "Imaginary Number," where they stand silent, not playing anything. Catherine calls them nerds, and Hal agrees, but he adds that they are nevertheless cool: they are professionally successful, socially adept, and sexually active. Catherine snidely guesses that he's in the band, which he admits.

Catherine proves herself to be quite perceptive—she can immediately tell that Hal is in the band that he tries to casually talk up.

When Hal invites Catherine to come with him, she refuses. He suggests another day, but she rudely reminds him that he has a job and band practice, so he must be busy. Hal admits that he doesn't have much time, but he wants to take her out. After a pause, he says that he loved her father, who helped Hal through a rough spot during his Ph.D. program. That was a few years back, during a "lucid year" that Robert had. Hal adds that if he could do even a fraction of the work Robert did, he could have a job at any math department.

Catherine's rudeness demonstrates her prickly character. Yet her rudeness is somewhat justified—Hal has been extremely pushy about seeing Robert's old notebooks and won't listen to Catherine's insistence that the notebooks only contain gibberish. His not trusting her has hurt his chances at building a relationship with her. Additionally, he comes off as a bit tone deaf; Catherine's father has just died, so his insistence on taking her out on a date feels rather disrespectful.

Catherine abruptly demands to see Hal's backpack, but Hal insists that he wouldn't take anything out of the house like Catherine suspects. Still, she accuses Hal of taking notebooks from Robert's office in hopes of stealing Robert's work to advance his own career. Hal swears this isn't true, but she doesn't believe him.

Catherine is interpreting Hal's respect for her father as evidence that Hal is trying to steal one of Robert's notebooks to publish under his own name. At this point, the audience is hesitant to believe Catherine—her hallucination of her father has deflated her credibility, so it seems like she may just be imagining Hal's nefarious intentions.

Hal tells Catherine to calm down, that she's being paranoid—after all, she herself just said that the notebooks were all gibberish anyway, so what would he steal? Catherine agrees and says that Hal has no reason to come back, since he agrees that the notebooks are worthless. Exasperated, Hal insists that someone needs to make sure.

Hal points out a flaw in Catherine's logic, but he does so in a sexist way Not only does he patronizingly tell her to calm down—men have a history of gaslighting women by telling them to stop being "hysterical," even when they have good reason to be upset—but he also keeps refusing to listen to Catherine, even though she, as Robert's daughter, likely knows more about Robert's notebooks than he does. At the same time, his dedication to looking over all the notebooks firsthand emphasizes how he values the role of evidence in trying to determine the validity of a claim. He wants proof *that what Catherine says is correct—he won't just take her word for it.*

Catherine interrupts, saying that she lived with Robert—since her mom died, she's the one who had to watch him descend into madness. He talked to invisible people, neglected his hygiene, and believed that aliens were sending him messages through the Dewey decimal numbers on library books. When he started writing dozens of hours a day, Catherine had to drop out of school. She tells Hal that she is glad that her father is dead.

Catherine made many personal sacrifices (such as quitting college) in order to take care of Robert. On top of her sacrifices, she had to go through the trauma of witnessing her father's mental deterioration. At this moment, Catherine feels resentful toward her father but, given her genial imaginary conversation with him earlier (and the fact that she decided to give up so much in order to care for him), it actually seems that she isn't "glad" that Robert's dead. Quite the opposite—she may be missing him so much that she imagined having a conversation with him. It's unclear why she imagined Robert, which adds another layer to the atmosphere of uncertainty in the play. In this passage, Catherine also describes Robert's mental health in more detail. He suffered from mental delusions and often saw things that weren't there.

Hal tries to empathize, but Catherine curses at him and insists that he doesn't know her. She just wants to be alone. Hal argues that he won't be the only protégé who will come around—people are already looking over Robert's old work and they will definitely want to know what's in the notebooks.

Catherine is clearly grieving, which makes Hal's pushiness about seeing the books even more disrespectful. He comes off as selfish and tone-deaf—he prioritizes finding evidence of Robert's genius over respecting Catherine's feelings. Unsurprisingly, Hal's persistence about reading the books annoys Catherine, showing how the (often unfeeling) search for proof can damage human relationships.

Suddenly, Catherine says that *she* will be the one to look through the books; Robert was her father, after all. But Hal says she doesn't have the skills required to determine what isn't nonsense. When Catherine insists that she does, Hal says that she only knows whatever basic math Robert taught her, which won't be enough to decipher her father's work—it would take a professional.

Hal doesn't know Catherine well at all, so his insistence that she doesn't know enough math to understand Robert's worth is founded on what Hal does *know about her: her gender. By underestimating her abilities, Hal appears to be employing the sexist stereotype that women are not smart enough to keep up with advanced mathematics. Hal takes it upon himself to act as gatekeeper to Robert's books, locking Catherine out of the opportunity to go through her own father's work.*

Catherine suddenly snatches Hal's backpack and rifles through it. But there's no notebook there, only various personal items. Embarrassed, Catherine tells Hal that he can come tomorrow. After a brief pause, Hal advises Catherine to go see a doctor or get into exercise, both of which helped him after his mother's death. Hal invites her one last time to the show, but she refuses.

Hal doubting Catherine's abilities makes her snap and snatch his backpack to search it, demonstrating how skepticism can harm interpersonal relationships. When the audience sees that Hal's backpack doesn't contain any notebooks, Catherine's credibility deflates further—she seems paranoid for having suspected Hal. At this point, it seems like she may be a bit unstable, perceiving things (like Hal's intention to steal) that aren't actually there.

As Hal gets up to leave, Catherine realizes that he has forgotten his jacket. But when she picks it up, a notebook falls out. "I'm *paranoid?*" she says to Hal before yelling at him to get out of her house. He insists that he wants to explain something, but she dials the police. As she tells the police that there's a robbery in progress, Hal tries to say that he borrowed the notebook not because of any math, but because of something Robert wrote about Catherine. As he starts to read, Catherine hangs up the phone.

Catherine's suspicions appear to be valid after all—Hal really was trying to steal one of Robert's notebooks. At this point, it appears that her perception was correct, a fact that redeems her credibility for the audience. She seems less unstable, and more astute. Hal, meanwhile, totally breaks her trust by lying about not taking a book from Robert's office. In response, Catherine calls the police, which shows how damaging doubt is for relationships; now that she knows she cannot trust him, Catherine has no interest in maintaining so much as a friendship with him.

Robert wrote that it was "a good day," since Catherine had some good news—Hal doesn't know what this refers to, but he thought Catherine might. Catherine asks when Robert wrote this, and Hal speculates that it was during his remission—Robert also wrote that while the "Machinery is not working yet," he can be patient. Hal clarifies that "The machinery" is what Robert called "his ability to do mathematics," Catherine brusquely says she already knows.

Hal begins to rebuild his credibility by giving Catherine definitive proof that he wasn't taking the book with the intention of stealing Robert's ideas. The book that Hal has taken is one that contains a journal entry, so it's unlikely that Hal was trying to take it for nefarious reasons, although he has yet to give an explanation for his theft. Additionally, Hal again exhibits sexist behavior when explaining Robert's terminology (his use of the phrase "The machinery") to Catherine, who, as Robert's daughter, would certainly already know. It is likely that Hal (who has already stereotyped Catherine as less intelligent because of her gender) is overexplaining to Catherine because he assumes that she, as a woman, knows less than he does, even though she is certainly a better source for knowledge on this topic (her father) than he is.

In the rest of the entry, Robert writes that he feels better when talking to students and doing "all the activities of 'normal' life," like going out to restaurants and going outside. He also expresses gratitude for Catherine's aid and sacrifice, acknowledging that he wouldn't be improving if she hadn't chosen to take care of him at home. Robert plans to take Catherine out to dinner that night for her birthday. Hal remarks that the entry is dated September 4, which is the same day as today.

Robert's journal entry shows one way that Catherine's decision to sacrifice much of her life to take care of Robert was a good decision. Robert believed that he wouldn't have been able to recover had it not been for Catherine's in-home assistance. By prioritizing his needs over hers and by listening to his desires, Catherine was a good caretaker to her father.

Hal hands Catherine the notebook, acknowledging that he shouldn't have tried to "sneak it out," even if his intentions were honorable. He wanted to wrap it for her and give it back as a birthday gift, which he now thinks was a stupid idea. He wishes her a happy birthday and then leaves. Catherine sobs for a moment, but she stops and curses when a police siren wails.

While Catherine was right in her instinct that Hal was trying to take one of Robert's books, she was totally wrong in his motives, which he has proven to her by showing her that the notebook contains only writing. Her skepticism further damages the chance that she and Hal will have a relationship of any kind, as he now sees his attempt to connect with her as a foolish one, since her response was anger and distrust. Once again, Catherine's credibility diminishes in the eyes of the audience—they have yet another reason to not trust her. At the same time, her misinterpretation of Hal's actions suggests that she may be slipping into the same state of mental delusion that her father had—she is perceiving things that aren't real—which may be proof that she has inherited his illness.

ACT ONE, SCENE 2

The next morning, Claire is drinking coffee on the porch, where she has set out bagels and fruit. After a shower, Catherine joins her, and Claire remarks that she looks much better. When Claire offers her coffee, Catherine says she takes it black, but Claire adds milk anyway. She presses Catherine to eat some food, but Catherine flatly tells her that she hates breakfast.

This is the first time that Claire makes an appearance onstage. It's immediately clear that Claire doesn't heed other people's requests. She pressures Catherine to do what she (Claire) thinks is best for her, instead of helping Catherine in the way that Catherine wants to be helped. In this passage, Claire demonstrates this tendency by putting milk in Catherine's coffee and pressuring her to eat breakfast, even though Catherine explicitly tells her that she doesn't want milk in her coffee and that she doesn't like breakfast.

Claire asks if Catherine has tried on the dress Claire got her or used the conditioner that Claire brought for her. But Catherine hasn't done either. After a pause, Claire asks Catherine if she needs anything, but Catherine says she is fine and doesn't need anything from Claire.

Again, Claire is pushing Catherine to do things—using a special conditioner and trying on a dress—that Claire thinks Catherine should do, even though Catherine isn't interested. It seems as though Claire doesn't trust Catherine to take care of herself; Claire's skepticism may be the reason Catherine dislikes her and declines her offers to help.

Claire wants to host some people after the burial this afternoon, but she offers to only invite people if Catherine feels up for it. Irritated, Catherine insists that she is fine and tells Claire to stop asking her the same question. As Claire explains her plans for the get-together, she keeps checking that Catherine is okay with everything, but Catherine unenthusiastically gives Claire the go-ahead. Pleased, Claire suggests that it'll be a good way for Catherine to relax after such a difficult time.

Claire seems to want Catherine's approval. She keeps checking in with Catherine after each decision, which suggests that she does want to be helpful. But Claire wants to care for her sister on her own terms. Instead of asking Catherine what would be best for her at the time, Claire makes decisions that suit her (like planning a party the day of the burial).

Claire tells Catherine that Mitch says hi and then announces that they are getting married. Catherine barely reacts, although she does manage to congratulate her sister, who merrily chats about the details of the wedding. When Claire asks Catherine to be in the wedding, Catherine agrees.

While Catherine seems to be very alone—she doesn't even have friends—Claire is getting married, which suggests that Claire has had time and energy to date and socialize. Catherine, on the other hand, has been taking care of Robert and hasn't been able to have a social life. While the audience doesn't know yet where Claire was during Robert's illness, it seems that she didn't pull her weight in taking care of Robert. This is likely another reason that Catherine resents her sister.

Cautiously, Claire asks Catherine how she is feeling about Robert's death, but Catherine doesn't elaborate beyond saying she's fine. When Claire asks what she will do now that Robert is gone—whether she will stay in the house or go back to school—Catherine has no answers. Finally, Catherine snaps at her sister, demanding why she is asking these questions.

Catherine's angry response to Claire's questions suggests that she suspects that Claire isn't asking her questions to discover how she really feels about things—Claire is likely searching for information that she can use to support her own arguments and opinions for what Catherine should do. Perhaps Catherine doesn't tell Claire how she is actually feeling (like how she is anxious about possibly inheriting Robert's mental illness) because she can't trust Claire to listen to her plans to handle the situation. She knows that Claire will want to decide what's "best" for Catherine if she finds out that Catherine is struggling with her mental health.

Claire admits that some police officers visited while Catherine was in the shower to check up on a call from last night. Without emotion, Catherine says this was "nice" of them. Claire asks why she called the police, and Catherine says that she called them about a robbery but hung up because she changed her mind.

Claire, it seems, suspects that her sister may be mentally unstable—police officers have told her that Catherine behaved very erratically the night before.

Confused, Claire asks a series of questions to which Catherine responds tersely, but eventually Claire pieces together the story about Hal and the notebook. She gently asks Catherine if she is dating or sleeping with Hal, which Catherine denies. Finally, Catherine realizes that Claire suspects Hal doesn't exist, and she bitterly tells Claire to phone the math department at the University of Chicago to confirm her story.

Claire doesn't believe what Catherine says because she suspects that Catherine is mentally unstable. Now it appears that Claire's questions for Catherine were motivated by her trying to figure out whether Catherine would admit that her mental health has been poor. Claire is twisting Catherine's words to fit a theory that she already has, that Catherine is mentally unstable. There is *evidence to support Claire's suspicions (after all, Catherine did hallucinate her father's presence), but her doubting Catherine nonetheless harms their relationship. Catherine is frustrated and bitter that Claire won't believe anything she says. Additionally, Claire shows herself to be an unreliable investigator. She says she wants to find out what happened the night before, but she isn't diligent in looking for evidence. She could call the University of Chicago to check the validity of Catherine's story, but she doesn't—she simply continues to (mis)interpret evidence to fit a theory that she already has.*

Claire still insists that Catherine's stories don't add up: did she call the police on a creepy guy or was she partying with her boyfriend? When Claire asks if she was drinking with Hal, Catherine says no. But Claire points to the empty champagne bottle on the table and Catherine insists she was drinking alone.

Claire doubts Catherine's reliability. Because Claire refuses to accept any information from Catherine, she constructs her own, incorrect version of events, which validates the importance of proof and evidence; without evidence, a person can jump to some very wrong conclusions. At the same time, the audience is reminded that they can't trust Catherine when Catherine insists that she was drinking alone. The bottle serves as a reminder of Catherine's hallucination—she didn't think she was drinking alone when she opened the bottle, but she was.

After a pause, Claire says that the police claimed that Catherine was rude and aggressive with them, even hitting one of them. Catherine doesn't exactly deny it, but she insists that the officers were condescending and disrespectful. When Claire says they were very nice to her, Catherine snaps that "people are nicer to you."

Claire further damages her relationship with her sister by taking the policemen's side. By refusing to believe Catherine's version of events, Claire breaks Catherine's trust and loses her credibility with her sister. Claire has proven several times that she will not believe or support Catherine so, as a result, Catherine has no reason to trust her sister, demonstrating how doubt breaks down a relationship. Claire shouldn't expect that Catherine will trust Claire enough to tell her how's she is really feeling when she has no reason to trust her.

Claire asks Catherine if she'd like to stay in New York City with her and Mitch. Catherine says no, but Claire insists that it would be fun, then she argues that it would be safer for Catherine. Increasingly irritated, Catherine insists that she's not interested in fun and she doesn't need a safe place.

Certain that Catherine is mentally unstable, Claire tries to convince Catherine to move to New York City so that she can look after her easily. Again, Claire is prioritizing her own desires over her sister's; Catherine doesn't want to move, but Claire insists that it's the right thing because it is most convenient for her (Claire). It seems like Claire may even believe that moving Catherine is the right thing to do for Catherine, which shows how easy it is to delude oneself into thinking that one's own desires are what are best for someone else.

As they argue, Hal calls out Catherine's name and then steps onto the porch. Catherine victoriously announces who he is then furiously tells Claire that she doesn't need her questions, criticism, or advice—she's totally fine on her own.

Hal's presence proves that Catherine wasn't imagining him—Hal really exists. Catherine is so pleased at Hal's presence that it seems like Hal is also proof to herself that she wasn't hallucinating. She's doubting herself and fears that her mental health is deteriorating, but she clearly doesn't feel like she can talk to Claire about it because Claire broke her trust. Hal's presence helps build Catherine's credibility with the audience, demonstrating how building trust is an ongoing process—she must continue to prove to the audience that they can trust what she says.

After an awkward silence, Claire calmly introduces herself to Hal, who asks if he can get some work in before the afternoon. Claire invites him into the house, and as soon as he's inside, she coyly mentions that he is cute. Catherine scoffs and insists that Claire owes her an apology. Claire replies that while they do need to make some decisions, she should have waited for later in the day. When Claire asks suggestively whether Hal would want a bagel, Catherine leaves.

Claire has a chance to begin rebuilding her relationship with Catherine—she could apologize to her. But she doesn't. She simply says that she should have waited with her questions. As a result, Catherine leaves the porch, signifying how she is uninterested in maintaining a charade of a relationship with Claire. Meanwhile, Claire continues to try to make decisions for Catherine by encouraging Catherine to flirt with Hal.

ACT ONE, SCENE 3

It's nighttime, and Catherine is again alone on the porch, this time wearing an attractive black dress. The party is going on inside the house, and the noise floats out onto the porch. As a band finishes a song, there's cheering—a few moments later, Hal steps out onto the porch, sweaty from playing. Catherine looks at him and says that the celebration might be a bit too much for a funeral, but Hal says that it's been a great time.

Claire gets her way—a party takes place the night of the funeral. When Catherine expresses her reservations about the party—she thinks it's inappropriately boisterous for a funeral—she gets silenced by yet another person: Hal. Throughout the play, Catherine isn't listened to by the other characters; in fact, it seems that the only person who believed in her was her father, Robert. Her frequent solitude (she's again alone on the porch) suggests that she doesn't have people in her life that she can trust to listen to her.

When Hal encourages Catherine to join the party, she declines. But she does accept one of the two beers that he is holding. As she drinks, Hal says that there are about forty people left, all of them mathematicians who were delighted to receive an invitation to the funeral of a man they admired so much.

Catherine is unsure how to feel about Hal. After all, he broke her trust by lying about taking one of Robert's notebooks, even though he planned to give it back as a surprise. She declines his invitation to join the party, but she does accept his beer, which suggests that she's willing to hold a conversation with him, even if she doesn't feel inclined to party with him.

At last, Catherine admits that one of the band's songs—the one called "Imaginary Number"—was a pretty nice tribute. Hal agrees; he thinks that the funeral was lovely, and that Robert probably would have enjoyed it. As Catherine eyes him, Hal concedes that it isn't his place to say such things. But she agrees; everything went better than she had anticipated.

Hal is too familiar with Catherine: he tells her that Robert would have enjoyed the funeral even though Robert is her father, not his. Hal hasn't built up the trust necessary to claim a close relationship with Catherine, so his comment comes off as presumptuous, rather than consoling. He still needs to prove that he is a trustworthy person before Catherine will feel comfortable confiding in him.

Hal compliments Catherine on her dress, and she replies that Claire gave it to her, but it doesn't fit. Hal insists that it looks nice. When Catherine asks Hal how long he thinks the guests will stay, he says he has no idea—mathematicians are intense partiers, which he knows from the wild conferences he has attended.

To prove his interest in Catherine, Hal compliments her. Catherine still doesn't seem ready to accept his flattery, but she does ask him a question to keep the conversation going, which shows her interest in him and demonstrates her willingness to give him a chance to further prove his intention to build a relationship with her.

According to Hal, quite a few older mathematicians are addicted to amphetamines, since they think "math is a young man's game" and the drugs keep them sharp. Catherine points out that Hal used the term "men," and he corrects himself to "young people." When Catherine suggests that most mathematicians are indeed male, Hal mentions that there are some women, like a woman at Stanford whose name he can't remember. "Sophie Germain," Catherine says, and Hal says he's probably seen her at conferences. Catherine coolly informs him that she was born in France in 1776.

This passage shows that Hal has some sexist beliefs. He accidentally implies that all mathematicians are men, which shows that he (perhaps subconsciously) sees math as a masculine field. This assumption is rooted in the sexist belief that women are not as smart as men and therefore aren't clever enough to keep up with their male counterparts in the field of math. Hal tries to backpedal by correcting himself and saying that he knows one female mathematician at Stanford, but his attempt to redeem himself goes south when he fails Catherine's test to see if he knows the woman's name. He loses some credibility in Catherine's eyes.

Awkwardly, Hal acknowledges that he was wrong. Catherine explains that Sophie Germain taught herself math during the French Revolution. When no school would accept her based on her gender, she used a man's name to write to another mathematician (a man named Gauss), sending him proofs involving prime numbers. Gauss was happy to work with "such a brilliant young man."

Sophie Germain was a victim of sexist discrimination—she wasn't allowed into universities because she was a woman. Her experiences demonstrate how the stereotype that women aren't as smart as men locks women out of opportunities. In order to advance her career, she had to masquerade as a man because she knew that people would not believe that she, a woman, would be smart enough to study math.

Hal realizes who Catherine is talking about—Sophie Germain is the person behind Germain Primes. He gives Catherine a simple example of a Germain Prime, and Catherine responds with a complex example, supposedly the biggest Germain Prime known. Hal is startled at Catherine's knowledge.

Hal again underestimates Catherine's abilities, which shows that he has internalized the sexist stereotype that women aren't as smart as men. Not only does he condescend to Catherine by explaining Sophie Germain's discovery—even though Catherine is clearly more knowledgeable than he is about who Germain is—Hal also gives Catherine a simple example of a Germain Prime, as though she wouldn't be able to understand more complex examples.

When Hal asks whether Gauss ever discovered Germain's real identity, Catherine says that he did. He then wrote to Germain, praising her tenacity and brilliance in the face of all the sexist obstacles that she encountered in late 18th-century France. Catherine quotes a part of Gauss's letter to Germain, but then she becomes self-conscious.

Germain's experiences show how sexist discrimination threatens a woman's chances of getting recognized for her talent. Because she had to use a man's name in her correspondence with Gauss, Germain's mathematical discoveries were almost not credited as hers—they were almost credited to a man's name. Luckily, Gauss did believe Germain when she revealed her identity to him, but this does point out another perverse side to sexism: women still have to rely on men to gain recognition for their accomplishments. Had Gauss not believed Germain, it's likely that her contributions would have been credited to a man's name or even to Gauss, if he chose to take them as his own. Catherine's interest in Germain suggests that she sees herself in Germain. Like Germain, Catherine is a female mathematician in a field that is overwhelmingly male. She, too, faces sexist skepticism regarding her abilities, which is most clear in her exchanges with Hal, who consistently underestimates her capabilities.

Hal is stunned for a moment, then he kisses Catherine before pulling abruptly away. He's embarrassed and apologetic, telling her he's drunk. Catherine says it's okay and apologizes for her behavior the night before—he can take as much time as he needs to go through the books. But Hal says that Catherine is probably right that all the notebooks are useless—so far, the only coherent one is the one he showed her last night.

Hal exhibits more sexist behavior: instead of addressing Catherine's obvious interest in (and knowledge of) Sophie Germain, he seizes his opportunity to kiss her. In this moment, he appears to be more interested in using her sexually than in getting to know her. Catherine, however, accepts the kiss, demonstrating that she isn't trying to shut him out. By conceding that Catherine was right about the notebooks, Hal is giving Catherine proof that he believes her, even though it has taken him a while to get there. He appears to know that he needs to show Catherine that she can trust him in order for them to have any kind of relationship.

Catherine isn't surprised, and when Hal says he'll probably quit reading the notebooks soon, she asks him about his research. His work discourages him; it will never compare to Robert's work. But Catherine reminds him that her father had to labor away at problems just like everyone else—he was just quicker at it. Hal isn't encouraged, and he says he'll probably end up teaching—after all, he's twenty-eight, already too old to keep up with younger, more creative minds.

Catherine seems willing to try to build a relationship with Hal. She continues the conversation by asking about his work and, when he expresses his discouragement, she comforts him. While Hal sees Robert's work as incomparably brilliant, Catherine tells him that Robert had to work hard just like everyone else. Her response suggests that she is familiar with her father's genius and, unlike others, isn't quite as daunted. It is unclear whether she is saying this just to comfort Hal or because her father's way of thinking isn't too unfamiliar to her (the implication being that she may have inherited some of his brilliance).

After a moment, Catherine asks Hal about his sex life, referencing the wild conferences he had mentioned before. Hal can't tell if Catherine is flirting with him, but he jokes that, as scientists, he and his colleagues like to experiment. Catherine laughs and then kisses him. Hal is taken aback but delighted. When Catherine says she enjoyed it, they kiss again.

Catherine and Hal continue to prove to each other that they are interested in building a relationship. The implication is that, in order to prove their romantic intentions, they have to give each other ample evidence that they are romantically interested in the other person.

After the second kiss, Hal says that he has always liked Catherine, even just from glimpsing her at a distance when she would visit Robert. They kiss again, and Catherine asks Hal if he remembers visiting the house four years prior. He does, and he's surprised that she remembers. Kissing him again, Catherine says that she thought he seemed "not boring." They kiss some more.

In order to prove to the other person that they are romantically interested, both Hal and Catherine give evidence of their interest: Hal tells Catherine that he always liked her and remembers the day they met. Catherine assures him that her first impressions of him were favorable. After proving to each other their interest, they continue to kiss, demonstrating how trust must be earned and proved time and time again in relationships.

ACT ONE, SCENE 4

The next morning, Catherine is sitting on the porch when Hal, who is partially dressed, steps out to join her. Claire is still sleeping, having drunk heavily with the mathematicians yesterday. There's a bit of awkwardness between Catherine and Hal, and Hal isn't sure whether he should stay or go. At last, he tells Catherine that he wants to spend the whole day with her, although he doesn't want to be too intense. She laughs at his awkwardness—both are relieved, and they kiss.

After sleeping together, both Hal and Catherine are unsure how to act with each other. Each one appears to need encouragement from the other person that they are still interested in building a relationship, particularly one that's more than just sexual. The implication is that, in building interpersonal connections, one has to continually prove one's trustworthiness. Hal does this by assuring Catherine that he wants to spend the whole day with her. In return, Catherine kisses him, expressing her desire that he stay.

As they break apart, Hal tells Catherine that last night was incredible. Catherine pauses and, after thinking it through, pulls out a key that's attached to a necklace that she is wearing. She gives the chain to Hal; he can use it to open a drawer in Robert's office. After Hal leaves, she smiles, privately excited.

At this point in the play, Catherine's budding relationship with Hal appears to be the only thing that makes her happy—she at last has someone whom she can trust. To demonstrate this trust, Catherine gives Hal a key to something (the audience doesn't know what) that she keeps locked away. The implication is that, now that Hal has given her evidence that she can trust him—he is actively working on building a relationship with her—she feels comfortable enough to trust him in return, which she expresses by giving him access to something that she doesn't trust others with.

Claire comes onto the porch, extremely hungover and cursing the physicists that she had tried to "keep up with" the night before. She tells Catherine that her dress looked good on her; to Claire's surprise, Catherine thanks her for the dress and says she loves it.

Catherine's budding relationship with Hal is giving her a lot of joy—so much so that she is even nice to her sister, thanking her for the dress. Catherine's kindness to Claire can be interpreted as Catherine giving Claire the opportunity to rebuild their relationship. Now that Catherine feels that she can trust one person—Hal—she appears to be more inclined to try building a relationship with Claire. In a way, when someone proves that they can be trusted, they are evidence that people in general can be trustworthy.

Claire takes a deep breath and tells Catherine that she wants her to come to New York City with her. At first, Catherine thinks Claire is talking about the wedding, but she realizes that Claire wants her to move permanently. Catherine politely declines, telling her sister that, after the past few difficult years, she wants some time to stay in Chicago to think things through before making any big decisions. But Claire tells Catherine that she is already in the process of selling the house—Catherine needs to leave soon.

Claire ruins her chance at rebuilding her relationship with her sister by giving Catherine evidence that Claire cannot be trusted to respect Catherine's wishes. While Catherine believes that the best thing for her would be to stay in Chicago and take some time to reflect on what her next step in life should be, Claire insists that she knows what's best for Catherine, which is that Catherine should move to New York.

Catherine is furious. Claire claims that she is trying to help and wants to make up for having left Catherine alone with Robert for so many years, but Catherine bitterly asks why she's trying to "help" now instead of years ago. Claire says she was too busy to live with Robert, then she suggests that their father would have been better off in an institution. But Catherine insists that being by the things that made him happy—the university, his students, his house—allowed him to get better, even if it was only for a short while.

Claire's version of helping—ignoring others' wishes when making plans that prioritize herself—hasn't just affected Catherine. Claire took this same approach when Robert was ill. Whereas Catherine sacrificed her life to give Robert what he wanted—a chance to live at home, surrounded by the things that made him happy—Claire insists that an institution would have been better. Claire may be saying this simply because she feels guilty that she wasn't as selfless as Catherine. It's possible that she even deluded herself into thinking that institutionalizing Robert was what was best for him, which demonstrates how easy it is for someone to convince themselves that what they want is what is best for other people. Either way, Claire continues to prove that she doesn't consider other people's wishes or opinions when she makes plans that affect them. Through Robert's journal entry (the one in which he says that Catherine's decision to give up much of her life to care for him saved him), the play makes it clear that Catherine's selfless approach to caretaking is the right one.

Nonetheless, Claire believes an institution would have helped Robert more, and also that Catherine may have "been better" in that scenario. Catherine demands to know what Claire means. Uncomfortably, Claire says that Catherine inherited some of Robert's genius *and* "instability." After a moment, Catherine sharply asks if Claire has been looking for institutions for her in New York.

Claire appears to feel guilty for abandoning Catherine to care for Robert on her own, which may be why she is so intent on "helping" Catherine now. Claire is certain that Catherine's extensive caretaking for Robert had a negative effect on Catherine's mental health, which suggests that familial influence isn't only limited to genetics. In other words, Catherine may be experiencing symptoms of Robert's mental illness not because she inherited the illness genetically, but because she spent a lot of time with Robert and the stress of caring for her ailing father harmed her mental health. In this way, a person's family influences them not just through genes, but through their environment as well. At the same time, Claire also makes it clear that she thinks genes still play a role: she believes that Catherine has inherited both Robert's brilliance and his instability. Her statement suggests that, in their family, genius doesn't come without instability—it's because Catherine is brilliant that she is showing signs of madness, and vice versa.

At first, Claire tries to deny it, but she does admit that the excellent doctors of New York City are indeed one of her motivations for encouraging Catherine to move. Enraged, Catherine begins to tell her sister that she hates her, but then Hal enters carrying a notebook.

Claire completely breaks any remaining trust that Catherine has in her when she admits that she has an ulterior motive for moving Catherine to New York: she wants to make Catherine get help for her mental illness. Not only does this show how Claire's doubting Catherine hurts their relationship (Catherine knows she cannot trust Claire to support her), but it also demonstrates another way in which Claire doesn't respect Catherine's wishes for her own future. The audience is sympathetic towards Catherine; at this point, Claire's method of caretaking—not listening to others' wishes and prioritizing what is most convenient for her—appears to be the wrong thing to do.

Hal asks Catherine how long she has known about the notebook. She says "a while," and he asks why she didn't tell him about it sooner. Catherine says that she hadn't known if she wanted to tell him. After a moment, Hal thanks her effusively. Confused, Claire asks what's going on.

The notebook is presumably the object that Catherine had locked away with the key that she gave Hal. She hadn't shown the notebook to him earlier because she wasn't sure if she could trust him—she waited until he had given her evidence that he was trustworthy. The implication is that one cannot simply claim to be trustworthy; one must prove it.

Hal announces that the notebook contains a very important **proof**, although he admits that he hasn't checked it. In fact, the proof is so complex that he isn't sure that he *could* verify it. It appears to be a theorem about prime numbers, which, if proven accurate, would be a ground-breaking discovery. Hal tells Claire that Catherine found it. But Catherine says she didn't find it—she wrote it.

The play never explains what exactly the proof proves, but it does imply that it may prove a pattern for prime numbers. Prime numbers are notoriously difficult numbers in math—while they are a sequence of numbers, there is no proven pattern to them. For Catherine (if she is indeed the author of the proof) to find a pattern to them, she would be seeing something that no one else has been able to. In this way, a unique ability to perceive what others can't is key to genius.

ACT TWO, SCENE 1

It's a September afternoon, four years earlier. Robert is sitting on the porch, an unopened notebook next to him. Catherine silently steps onto the porch, thinking Robert is asleep—but Robert surprises her by greeting her. She asks him what he wants for dinner, and he suggests that they go for a walk and then get groceries together.

The second act begins in a way that curiously mirrors the beginning of the play: someone is on the porch when someone else comes up behind them. Only, in this scene, Robert is the one already sitting on the porch, and Catherine is the one who steps onto the porch behind him. This scene makes the audience recall the beginning of the first act and how the conversation that took place turned out to be imaginary. With Catherine's hallucination in their minds, the audience cannot be sure whether to believe what they are about to witness.

Catherine abruptly tells Robert that she's going to start school at the end of the month at Northwestern. He asks why she's not going to University of Chicago, which is much closer, but she says she would feel strange being a student in his department. Robert has been doing so well recently that he doesn't need her as much—it would be fine for her to move to Evanston.

The audience now realizes that this scene is taking place during Robert's remission. Catherine, who sees that Robert is doing better, hopes that she will be able to reclaim the things she gave up, such as her education—she wants to go to college to study math. By choosing Northwestern instead of University of Chicago, Catherine demonstrates her desire to carve out her own life. She doesn't want to study where her dad teaches; she wants to make a name for herself elsewhere. She wants to be her own person and not just a copy of her father.

But Robert questions Catherine's choice to move (he says it's a "big step") and whether she can keep up with her studies. He's hurt that she didn't talk to him sooner, particularly when he learns that Claire already knows. Catherine insists that she'll move back if he gets sick again, but he asks bitterly why she is bringing up his sickness, sarcastically adding that she expects him to accept the "conversation as a vote of confidence."

Robert's resistance to Catherine's decision to start school isn't explained, but it may be because of the following factors: one, Robert may be nervous that Catherine's departure will lead to a return of his sickness (after all, her taking care of him seems to be the cause of his remission), and two, he may feel betrayed that she's leaving him. His sense of betrayal is increased when he finds out that Catherine already told Claire her plans. His negative reaction to Catherine's announcement demonstrates how trust is something that requires constant evidence; even though Catherine has shown over the years that she loves and cares about Robert, this sign that she is prioritizing her own desires makes him fear that she won't provide the care he needs.

At that moment, someone knocks on their front door. Catherine leaves the porch to answer it. She returns to the porch with Hal, who is carrying an envelope. Robert informs Hal that he came at a terrible time, as he and Catherine are arguing. When Hal asks about what, Robert says it's about dinner.

Robert and Hal clearly aren't close enough for Robert to tell him why he and Catherine are fighting. They haven't built that kind of relationship yet.

Hal awkwardly suggests that he come back at a different time, but Robert tells him to stay and insists that they will give their argument a break and return to it after they've calmed down. Catherine begins to head back inside, but Robert asks her to stay. He introduces Hal and Catherine; Hal is one of his Ph.D. students.

Despite their argument, Robert still respects Catherine, which he makes clear when he asks her to be a part of his and Hal's conversation. Perhaps he has already begun to reconsider his rather hurtful reaction to her announcement. Regardless, it's evident that he and Catherine are close enough where one argument doesn't deteriorate their entire relationship.

Hal gives Robert the envelope, which he says is only a draft. Robert congratulates him and promises they'll work through any issues together. Then he announces that Catherine is going to start at Northwestern's math department, which surprises her. Robert says she will have to work very hard to catch up, but he is confident that she'll do well.

Robert has already changed his mind. Again, the reasons for this change aren't explained, but it's possible that talking about math with another young person has made him excited to talk about his passion—math—with his daughter as well. By making it clear that he has confidence in Catherine's abilities, Robert is laying the groundwork to repair whatever trust he may have broken. In this way, the play again shows that trust must be continually built.

Hal assures Catherine that she'll have a great time at school, adding that it's always nice to go somewhere new and leave one's old house. When Catherine is uncomfortable, Hal gets embarrassed and tries to take back his comment. But Robert says that it's great for Catherine to leave and jokes that he can't wait to have some time for himself.

Catherine and Robert appear to have a loving relationship. They're able to quickly bounce back from their fights, possibly because there is so much evidence that they care for each other—Catherine has spent the last few years proving to her father that his happiness is of paramount importance to her. In this way, Catherine's caring for her father has helped her in the sense that she enjoys a healthy and strong relationship with him.

When Hal asks Robert if he's working on anything, Robert says no and adds that he's glad to have some time to enjoy the Chicago fall. He loves watching students come back to campus; his favorite thing is to watch them browse books, especially used ones. It makes him think of what valuable things they will find and "What kinds of ideas they'll come up with." Then he tells Hal and Catherine that generating new ideas does get a lot harder the older a person gets.

Robert's musings about students in old bookstores illustrates another side of heredity: parents often hope that their children will take after them and carry on their legacy while also becoming their own person. Like students going through old books, children can use what they inherited or learned from their mentors to come up with their own ideas. In this way, parents can live on in their children.

Catherine says that Robert may "get lucky," but he replies that perhaps she will "pick up where [he] left off." After a quiet moment, Hal announces that he has to leave. Robert suggests a time to meet about the draft before interrupting himself to wish Catherine a happy birthday, apologizing for having forgotten about it.

Robert concretely expresses his hopes for Catherine when he tells her that she may "pick up where [he] left off." He believes that she has inherited his talent for math, and he hopes that she will carry on his legacy by making her own discoveries.

Catherine assures Robert that it's okay. He tells her that he will take her out to eat and drink that evening, and the two of them joke about what they will order. Remembering that Hal is still with them, Robert invites him along. Catherine also urges Hal to come, and there's a moment of expectation between them. Nonetheless, he declines. Catherine gets up to let Hal out. After they leave, Robert opens the notebook next to him, writing that it's "A good day."

Catherine doesn't appear to be hurt at all that Robert forgot her birthday. Perhaps it's because he has just given her lots of other proof that he cares for and loves her—he has told her he supports her decision to go back to school, and he has expressed his confidence in her abilities. The tension that was present earlier in the scene has vanished. Meanwhile, there's a moment of expectation between Hal and Catherine—it is likely that she is hoping that he will show romantic interest in her by agreeing to join them for her birthday celebration. The implication is that there may have been some sexual tension between the two, but that when Hal has his chance to prove his dedication to getting to know her by joining her for dinner, he declines and, by declining, makes Catherine reconsider whether he really was interested. After Catherine and Hal exit, Robert opens the journal and begins writing the entry that Hal shows Catherine in the first act. It's the entry that proves that Catherine's selfless caretaking was the right thing to do—he credits her in-home help for his remission.

ACT TWO, SCENE 2

It's the day after the party, right after Catherine announced that she wrote the **proof**. Hal is baffled, asking multiple times if she really wrote it. Claire asks Hal how and where he found the notebook, cutting off Catherine whenever she offers answers. Claire eventually asks Catherine directly if she wrote the proof, and Catherine says yes—she started it when she got depressed after she had to drop out of school to take care of Robert.

Neither Hal nor Claire appears to believe that Catherine wrote the proof. Although the characters haven't explained why they doubt Catherine, the audience may also feel hesitant to believe Catherine—from her imagined conversation with Robert to her paranoid assumption that Hal was stealing notebooks, the audience has good reason to doubt Catherine's word. They need more evidence to believe her statement. If Catherine did write the proof, it is important to note that she did so during a period of depression. It would seem that mental illness and genius are inextricable from each other. If the proof is hers, it would mean that she inherited both Robert's mental instability and his genius, both of which come into play when she writes this proof.

Claire doesn't believe Catherine, because it's written in Robert's handwriting. Catherine asks Hal to confirm that it is actually her handwriting and not her father's, but Hal isn't sure. Claire then asks Catherine to explain the **proof** without using the book, which Catherine angrily says is impossible—it's extremely long, and she didn't memorize it.

Claire's immediate refusal to believe Catherine is in-line with her behavior so far—she never respects what Catherine says. Therefore, it's not a surprise that she doesn't believe that Catherine wrote the proof, particularly because Claire believes that Catherine is succumbing to the same mental illness that Robert suffered from. As a result, Claire interprets information to match her theory, as opposed to objectively gathering evidence to make a claim. But with Catherine's history of delusions, it does make sense to be skeptical of her claim. In order to get Claire, Hal, and the audience to believe her, Catherine needs to provide proof.

Claire relents and tells Catherine to go over the **proof** with Hal. But Hal raises the possibility that Robert went over it with Catherine before he died. He suggests that he take it to some "guys" in the math department, and Claire agrees.

Hal, like Claire, doesn't believe that Catherine wrote the proof. He's so certain that Robert wrote it that he refuses to compare Catherine's handwriting to the handwriting in the proof. In this way, Hal is also so set on proving his own theory that he passes up evidence that could be important to finding out who is the author of the proof. All the same, Hal is intent on rigorously analyzing the proof, which he wants to do with some of his colleagues. Given that Hal refers to his colleagues as "guys," either all his colleagues are men, or all the colleagues he would trust with this project are men. The former suggests systematic sexism (women are not being encouraged to study and research math at high levels) while the former suggests Hal's internalized sexism—he only trusts men to be smart enough for this project.

But Catherine refuses, exclaiming that Hal wants to claim the discovery as his own. Hal denies this; he just wants to know more about the **proof**. When Catherine says that she can explain it to him now, Hal tells her that "[she] [doesn't] know." She claims again that she wrote it, but he says that it's written in Robert's handwriting. Catherine quietly insists that her handwriting looks similar to her father's.

Now that Hal has broken Catherine's trust in him by not believing that she wrote the proof, she feels that she can't trust him with anything. Trust is easily broken. Catherine is even certain that he is going to try to take her discovery as his own. Given that Hal is a man, it is likely that he would be believed over Catherine who, as a woman, would likely be dismissed as incapable of discovering something so innovative. In this way, Catherine's chance at being recognized for her work lies in Hal's hands.

Catherine laments that she trusted Hal with her work; she chose him to be the first person that she told. When she asks if he wants to test her handwriting, he replies that Robert could have dictated it to her. As a mathematician, he "know[s] how hard it would be" to make this kind of discovery. When Catherine reminds Hal that she, too, is a mathematician, he dismisses her, saying that she only took a couple college classes and that this kind of math could only be accomplished by someone like Robert when he was "at the peak of his powers."

Catherine is really upset that Hal doesn't believe her. She had waited to show off the proof until she found someone that she could trust. Up until this moment, Hal and Catherine's budding relationship was steadily building. But by not believing her, Hal destroys their relationship. While Hal may have good reason to suspect that Catherine didn't write the proof—the handwriting looks like Robert's and Catherine has only a little formal education—his skepticism also appears to be motivated by sexist thinking. It's suggested that one of the reasons that Hal doesn't believe that Catherine wrote the proof is that he doesn't think that she, a woman, could write something so innovative. He condescends to her, dismissing her abilities and implying that she isn't really a mathematician like he is. The only person that Hal thinks could write the proof is Robert, a man. If Catherine did indeed write the proof, then Hal's sexist stereotyping threatens her chance of being recognized for her work. Additionally, if Catherine is the author, then she and her father are even more similar than the audience knew—her ingenious work looks like his.

Furious, Catherine tells Hal that just because the work is "too advanced" for him doesn't mean that she didn't write it. People like Hal just don't want to believe that she—someone who never got a Ph.D.—could accomplish such ground-breaking work. Without a word, Hal leaves the porch.

With their relationship now in tatters, Catherine insults Hal. While she doesn't call out Hal's sexism, she does call out his elitism—he seems unwilling to accept that someone who hasn't undergone his training could discover something so beyond his comprehension. This elitism is similar to Hal's sexism in that, in both cases, Hal is resistant to believe that someone who isn't him—an educated male—could accomplish something that he can't.

Catherine is distraught. After a moment, she tries to destroy the notebook in her hands, but Claire grabs the book away from her. When Catherine manages to wrestle it back, she simply throws it to the ground and walks away.

Catherine is devastated that neither Hal nor Claire—but particularly Hal—believes her. Their skepticism appears to be taking a toll on her already fragile emotional state. She almost tries to destroy the proof, which, if hers, is extremely valuable to her (it could jumpstart her career and make her famous). Her attempt to destroy it suggests that she is despairing, no longer interested in her future now that the one thing that was giving her joy—her budding relationship with Hal—is destroyed.

ACT TWO, SCENE 3

The next day, Hal knocks on the door and calls for Catherine. Claire steps onto the porch and explains that she had to delay her flight because Catherine is refusing to eat or leave her room. Hal wants to see Catherine, but Claire doesn't let him—she thinks it would be a bad idea.

Catherine appears to be undergoing a mental breakdown: she isn't eating, and she is isolating herself. The cost of Hal and Claire's skepticism, then, is Catherine's mental health.

Claire asks why Hal slept with Catherine, suggesting he took advantage of her. But Hal insists that it was consensual and asks again to see Catherine. When Claire doesn't budge, he angrily tells her it's not right to take Catherine to New York against her will. Hal suggests that seeing Catherine would help her, but Claire snaps that he—like all mathematicians—isn't thinking. She promises to give him her New York phone number once she gets Catherine settled there.

The audience gets a glimpse of what Claire is like as a caretaker. She refuses to let Catherine have contact with anyone else, deciding for her that seeing Hal would be a bad idea. She doesn't try to check in with Catherine to see whether she would like to see Hal, but instead dictates the terms on which Hal can contact Catherine.

Hal agrees, but he doesn't move, since he has another reason for coming. To his surprise, Claire hands him the notebook, saying he can have it. Hal is confused—he thought that he'd have to argue for it. Claire snidely suggests that the notebook is the main reason he came, which Hal denies.

Claire doesn't believe that Hal respects her sister. And, indeed, that's what appears to be the case. Claire knows that her sister is in a fragile state, so it's reasonable for Claire to worry that a man is exploiting her sister's vulnerability for his own sexual gain. Additionally, even though Hal denies that the notebook is the main reason for his visit, it does seem that way—although he is willing to leave when he cannot see Catherine, he is ready to argue extensively for the notebook. His claim—that seeing Catherine, and not the notebook, is why he stopped by the house—is meaningless without proof.

Claire says she trusts him with the notebook, adding that he should call her when he has more information. As Hal begins to leave, Claire asks him to explain the **proof** to her. Hal asks how much math she knows, and she responds that she, a currency analyst, is pretty good with numbers—but she has only a fraction of Robert's genius. Catherine is more gifted, although Claire isn't sure *how* gifted.

While Catherine doesn't trust Hal with her sister, she does trust him with the proof. It's not clear why Claire believes that Hal can be trusted with the notebook (and not claim it as his own). Perhaps it is because she noticed Hal's dedication to giving Robert credit for his genius—his hours of reading the notebooks are evidence of his desire to publish Robert's work. Or perhaps the play is suggesting that, in times of uncertainty, it is sometimes necessary to make a leap of faith in order to reach one's goals. Claire, like Hal, wants to know who wrote the proof. In order to know, she has to trust someone else to analyze it—as she says, she isn't mathematically talented enough to understand something as complex as the proof. Claire's comment about her intelligence has another significance—it supports the play's message that genius and mental instability are inextricable from each other. In Catherine and Claire's family, one either has both or one has neither. While Catherine appears to have inherited Robert's mental illness along with his brilliance, Claire got neither (or, at any rate, only a fraction of Robert's talent).

ACT TWO, SCENE 4

It's December, about three-and-a-half years earlier. On the porch, Robert is wearing a t-shirt and writing in a notebook. Catherine steps outside wearing a winter coat and asks what he's doing. He says it's too hot in the house and that the heaters make it hard to concentrate. Catherine then asks why he didn't answer the phone—she's been calling, and she had to miss class to come check on him. As Catherine hands him a coat, he says that the phone distracts him.

Like the opening scenes of both Act One and Act Two, this scene also begins with Robert and Catherine on the porch. At this point, the audience is still unsure whether Catherine did or did not write the proof. With this scene beginning in a similar way to two other scenes—one where both Catherine and Robert seem stable, and the other where Catherine appears to be suffering from delusions—the sense of uncertainty builds: will this be the scene where the audience discovers if Catherine really wrote the proof? Or will this scene prove that she's delusional? The audience needs more evidence to be sure. Robert is writing furiously in a notebook, which may mean that he's experiencing a stroke of genius and is writing the proof, or it may mean that his mental health has now deteriorated, and he's writing compulsively. It's hard to tell, and this ambiguity highlights how genius and madness may look similar.

Robert then announces that "The machinery is […] on full-blast"—his mind is working creatively, like it did when he was 21. Surprised, Catherine asks if she can look at what he's been working on. Robert asks if she is actually interested, but it's clear she's excited. He tells her tenderly that it makes him very happy that she is following in his footsteps by becoming a mathematician.

According to Robert, he's experiencing a burst of creative energy. But the audience, who knows that Robert compulsively wrote nonsense in his later years, doesn't know whether to believe him. The audience needs actual evidence to support Robert's claim. If Robert is actually experiencing a relapse of his mental instability, then it is important to note that even Robert confuses his moments of genius with his periods of mental illness—both would feel as though his brain is "on full-blast," perceiving things that others cannot. Catherine's excitement over Robert's work suggests that she has inherited his passion for math, which makes Robert very happy—he wants her to be like him in this way.

Robert confesses that he had been terrified that he would never be able to work like he used to. But it comforted him to know that Catherine would be able to finish the work he started. In fact, this is one of the main reasons people have children: a person's kids can achieve what the parent couldn't.

To Robert, it's reassuring to know that his daughter will carry on his legacy. Family is one way in which people live on after death—their children carry on their genes and (hopefully) achieve what they couldn't.

Now that his mind is working again, Robert tells Catherine that the two of them can work together. He selects one of the notebooks and gives it to Catherine. She reads a bit of it before telling Robert that they should go inside.

Robert clearly has confidence in Catherine's abilities—he, a genius by all accounts, wants her help and input on his work, which suggests that she has indeed inherited his abilities. But when Catherine reads the notebook that he gives her, she doesn't respond positively; instead, she simply tries to persuade Robert to go inside. Her reaction suggests that there may be something wrong.

Robert refuses to go inside until they talk through the **proof**, so Catherine begins to read the notebook aloud. It's just gibberish, a string of thoughts about temperature, months, bookstores, and the occasional number. Robert begins to shiver. Catherine closes the book and leads him into the house. Robert begs her not to leave, and Catherine promises she won't.

Robert's "proof" turns out to be evidence that he has slipped back into a state of mental delusion. Curiously, in his writing, he makes a series of incoherent connections. During this state of mental instability, Robert perceives patterns and meanings that others cannot see, just like during his periods of genius. At the same time, Robert's gibberish "proof" suggests that he wasn't the one who wrote the proof Catherine claimed to have written. Given that Robert wasn't mentally sound enough to have written the proof, Catherine's claim seems a lot more believable. Catherine also demonstrates her selflessness and dedication when he begs her not to leave him. Having already cared for him for years, Catherine knows that taking care of Robert will mean giving up her social and academic life. Yet knowing that he wants her to care for him at home, she respects his wishes.

ACT TWO, SCENE 5

It's a week after Claire gave Hal the notebook. Claire is on the porch, where she grasps a plane ticket and checks her schedule. Catherine steps outside carrying some bags. Claire gives her a cup of coffee and rambles a bit about a nice coffee shop in New York that that Catherine will enjoy. Catherine seems mildly interested, but there is an awkward pause.

Catherine's carrying bags onto the porch signifies that she has given in to Claire's demands: she's going to move to New York City. No longer resistant to Claire's arguments, it seems like Catherine's spirit was crushed once Hal broke her trust. She doesn't seem to have confidence in herself, either, so she has let Claire dictate her next life step.

Claire is overly attentive to Catherine, asking if she wants to go inside or wear a jacket, or if she wants some time to be alone before they leave. Catherine says she is fine. Claire says that moving is the right choice—while it will be hard to leave, everything will be better once they get to New York.

Now that Claire has got her way—Catherine has agreed to move to New York—she keeps asking Catherine about her preferences for small things, like whether she wants to wear a jacket. At this point in the play, it's clear that Claire doesn't actually respect Catherine's wishes. She just wants affirmation from her sister that her own decisions are the right ones—possibly to assuage her guilt for prioritizing herself over her sister—but she will never actually change her plans to reflect her sister's desires.

At first, Catherine passively accepts what Claire is saying, but the more Claire tries to empathize with her, the more sarcastic Catherine becomes. Eventually, Catherine exclaims that she can't wait to blame Claire for all her problems during therapy.

Catherine at last shows a sign of her spunk when she insults Claire, implying that Claire is the reason for all her problems. Catherine may have snapped because Claire was acting as though the two of them are closer than they are. Catherine, however, doesn't feel close at all to her sister, since Claire broke her trust multiple times, from having left her alone to care for Robert to not believing that she wrote the proof. Catherine's sarcastic attitude reminds Claire that they do not have a good relationship.

Aggravated, Claire tells Catherine to stay in Chicago if she thinks she can handle it. Catherine insists that while she is going to go to New York, she could stay if she wanted to. But Claire notes that Catherine couldn't even get out of bed for almost a week. When Catherine insists that she was simply tired and didn't want to talk to Claire, Claire tearfully tells Catherine to just stay in Chicago. Catherine asks what she would do and Claire tells her to "figure it out" and storms off the porch.

Claire does seem to have good reason for wanting to give her sister medical help—Catherine just suffered a mental breakdown that left her bedridden for a week. But Claire's problem lies in how she is trying to help her sister. Instead of heeding Catherine's wishes for how she wants to be cared for, Claire chooses what's most convenient for her (such as moving Catherine to the city where Claire lives) and then tries to convince Catherine (and perhaps herself) that this is what's best for her. Claire's method of "caretaking" has a disastrous outcome: it destroys her and Catherine's relationship.

Catherine remains on the porch and Hal suddenly appears, sweaty and out of breath from running. He's relieved that Catherine is still there. Brandishing the notebook, he tells her that the **proof** is solid. He's looked it over two times with multiple guys—both old and young. While there are some unconventional moves, the proof checks out. Catherine coolly tells him she already knows.

Hal was clearly rigorous in checking the proof—he's gone over it multiple times with several different people to make sure that the proof is accurate. Catherine is unimpressed with his "discovery," since she is presumably the author of the proof and therefore already aware that it works.

When Catherine tells Hal that she's leaving, he asks her to wait. Apathetic, she tells him to publish the **proof**, and that she doesn't care if he publishes it under her father's name, or even his own. But Hal tells her that he doesn't think that Robert wrote the proof after all; it uses some recently developed mathematical techniques, ones that Robert likely wouldn't have known.

Since Hal broke her trust, Catherine is uninterested in what happens to the proof. The proof seems to have been her way of proving her capabilities and talent, so now that she suspects that she won't get the credit, she doesn't really care about its fate. She's clearly aware that people will likely believe that Hal or Robert—both men—wrote the proof. As a man, Hal has the power in this situation; if he tells the math community that he or Robert wrote the proof, he would be readily believed, while Catherine would have no evidence to prove that she is actually the author.

Catherine replies that Robert could have read about the newer techniques. Hal admits that it's possible, but that the **proof**—unlike Robert's other notebooks—is undated. As for the handwriting, "Parents and children sometimes have similar handwriting, especially if they've spent a lot of time together." After a moment, Catherine tells Hal that she already told him all this, but he "blew it." She sarcastically congratulates him on "[getting] laid *and* […] [getting] the notebook."

At last, Hal believes that Catherine wrote the proof because he found evidence to prove that it was hers. This evidence also signifies that Catherine is her own person, and not just a replica of her father. At first glance, Catherine's work looks a lot like Robert's, so much so that Hal and Claire mistook it to be his. But, in the end, her work bears signs that someone other than Robert wrote the proof: the books aren't dated, and the techniques are newer. Hal also concedes that "Parents and children sometimes have similar handwriting, especially if they've spent a lot of time together," which makes the important point that Robert's influence on Catherine isn't just genetic—it's also due to the fact that they lived together for years and had a very close relationship. Hal has been very diligent in gathering information to determine who wrote the proof. Although he had originally dismissed Catherine's claim, he nevertheless reevaluated it as he kept analyzing the proof. In the end, Hal's skepticism and relentless analysis of evidence led him to right conclusion (that Catherine is the author), even though his doubt hurts her feelings. While Hal feels victorious in his discovery, Catherine is very cold to him. It doesn't matter to her that he's changed his mind to side with her—he broke her trust and destroyed their relationship.

Hal says he would love to at least hear Catherine talk about writing the **proof**, but she says no and refuses to even take the notebook back. Hal asks her how he can remedy the situation, but Catherine exclaims that he can't—all of his math and research doesn't change the fact that he didn't believe her. Hal concedes that he should have.

Catherine doesn't care that Hal believes her now that he has the evidence needed to prove that her claim was true. She had trusted him enough to show him her proof, but he broke her trust when he didn't believe her.

After a moment, Hal asks Catherine if she's really going to New York City. She says she is, and Hal urges her to stay in Chicago. She says that it might be nice to be taken care of and to get out of the old, drafty house. When Hal quietly assures her that there's nothing wrong with her, Catherine admits that she's afraid she is like her father, to which he responds that she is "not him […] Maybe [she]'ll be better." He holds out the book, and she accepts it.

The only way for Hal to rebuild his relationship with Catherine is to prove to her that she can trust him—he needs to give her evidence that shows that he is trustworthy. He does just this, expressing his desire that she stay in Chicago and assuring her that he has confidence in her talent and her mental health. Catherine, meanwhile, is still anxious that she has inherited Robert's mental illness. Hal tries to comfort her by telling her that she is her own person and that she may prove herself to be healthier and more talented than Robert. After all, she just demonstrated her genius by writing a groundbreaking proof. What's more is that she has a unique style and thought process that distinguishes her from her father. At this point, the conversation is less antagonistic, and it seems that Hal has convinced Catherine to give him another chance. While she still seems hesitant, he has nonetheless given her evidence that he is interested in her, believes in her capabilities, and is prepared to continue to prove his worth.

As she traces her fingers over the book, Catherine tells Hal that writing the **proof** was like "connecting the dots." She never worked on it with Robert, although sometimes she'd watch television with him in the middle of the night when she felt stuck. She slowly explains that, while her proof works, it isn't as "elegant" as Robert's work. Hal encourages her to talk it over with him, that maybe she'll be able to improve it. Catherine hesitates—but after a moment, she opens the notebook and begins reading.

Once again, genius is associated with perception. Catherine's proof is a ground-breaking and historic proof; as Hal explained earlier in the play, mathematicians have been trying to prove Catherine's mathematical theory for centuries, but no one ever managed to do it. Yet, for Catherine, writing the proof was simply a question of perception—as she tells Hal, writing the proof was like "connecting the dots." The implication is that Catherine can see connections or patterns that others can't. Significantly, this is similar to both her and her father's mental illness. For both of them, they often perceived or imagined things that weren't there. This is what makes it so difficult to distinguish their madness from their genius: in both cases, they are interpreting the world in a unique way. In fact, it is due to this exceptional perception that Catherine is able to write her innovative work. But Catherine doesn't feel satisfied with her work yet—there are still points where it could be improved. At the end of the play, she makes a leap of faith in deciding to trust Hal again when she agrees to let him help her on her proof. Although he broke her trust before, Catherine is willing to give him another chance. Hal, eager to show her that she can count on him, assures her that he has confidence in her ability to improve it.

💬 HOW TO CITE

To cite this LitChart:

MLA

Thompson, Annie. "*Proof.*" *LitCharts*. LitCharts LLC, 29 May 2021. Web. 29 May 2021.

CHICAGO MANUAL

Thompson, Annie. "*Proof.*" LitCharts LLC, May 29, 2021. Retrieved May 29, 2021. https://www.litcharts.com/lit/proof.

To cite any of the quotes from *Proof* covered in the Quotes section of this LitChart:

MLA

Auburn, David. Proof. Farrar, Straus and Giroux. 2001.

CHICAGO MANUAL

Auburn, David. Proof. New York: Farrar, Straus and Giroux. 2001.