

Enchanted Traits

Part 1: Tree Study—Forbidden Forest

You are an arborist (a scientist that studies trees) and have been asked to document the height of two types of trees that grow in the Forbidden Forest.



Azkaban Oaks



Hogwarts Pines

You will study a section of the forest where all of the trees are the same age. On the paper we cannot fit a tree that is 10 m tall, so we have a system that maps the height of the actual tree to the height of the tree on our paper, this is called a scale.

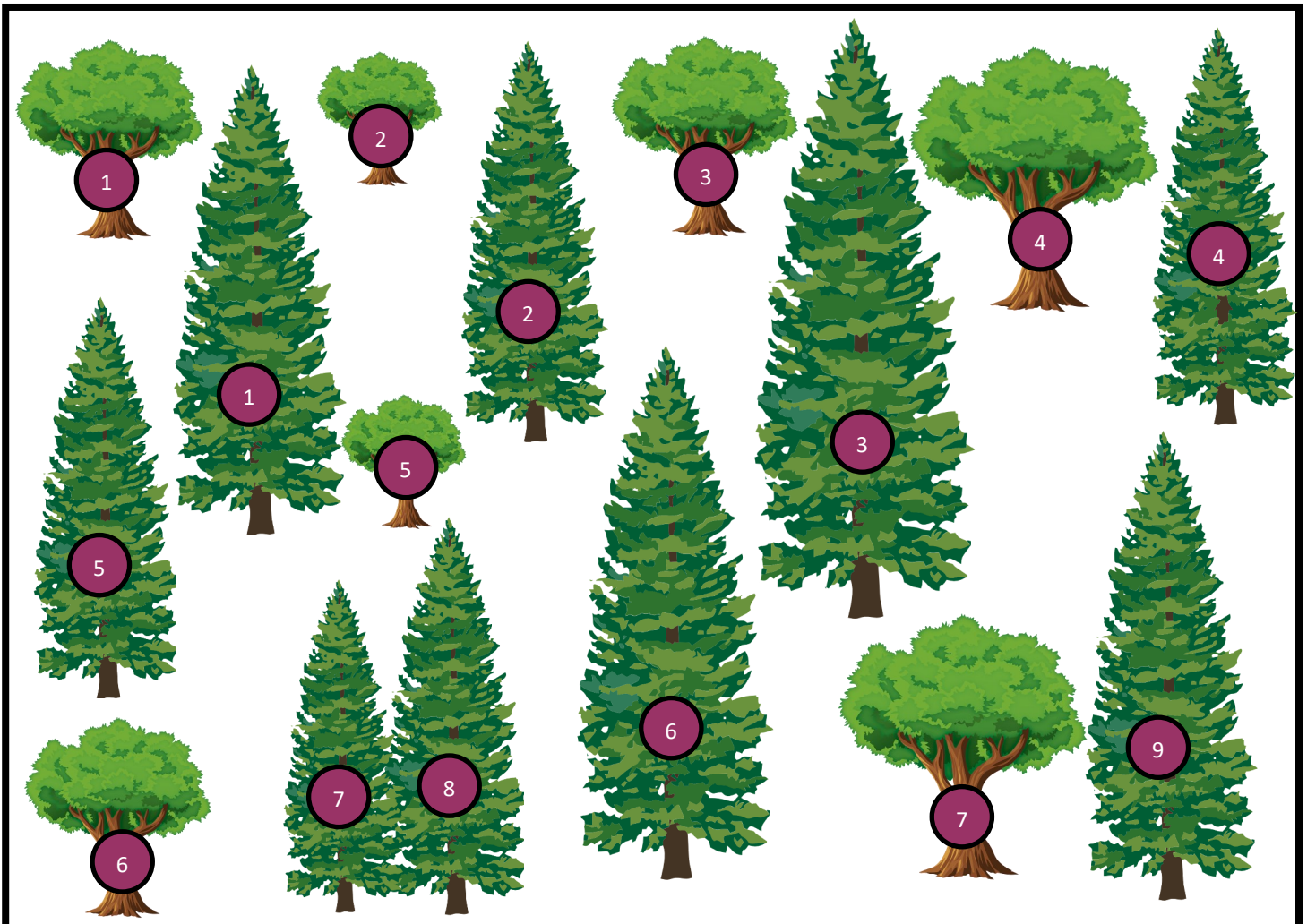
Our scale: 1 cm = 1 m

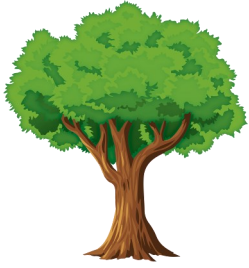
Therefore, if a tree is 5 cm tall in the picture it is 5 m tall in the forest. Let's practice by measuring the height of this wand to the nearest cm.

1. The measured height of the broomstick is _____. In the forest, the broomstick would be _____. In our data table we will record the broomstick height as _____.



Research Section of Forbidden Forest



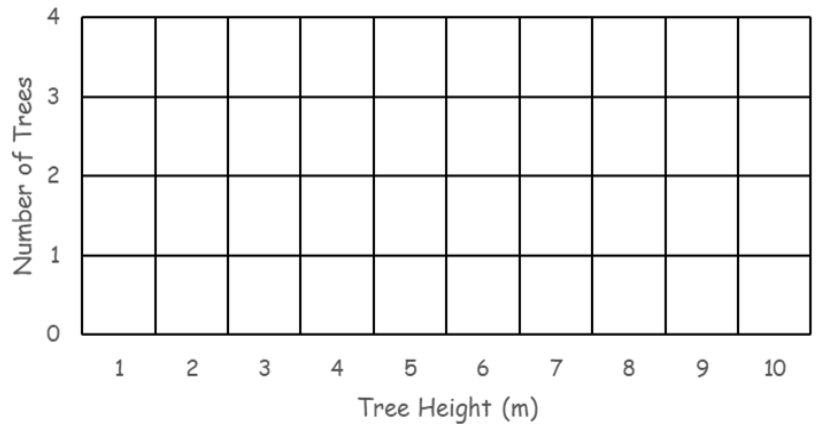


Forbidden Forest: Azkaban Oak Study

Tree Number	Height (m) 1 cm = 1 m
1	
2	
3	
4	
5	
6	
7	

Graph the data you collected below.

Forbidden Forest: Azkaban Oaks



- Are all of the Azkaban Oaks the same height in the Forbidden Forest? _____
- What is the height of the tallest Azkaban Oak in the Forbidden Forest? _____
- What is the height of the shortest Azkaban Oak in the Forbidden Forest? _____
- What is the range in heights (height of tallest tree – height of shortest tree) of Azkaban Oaks in the Forbidden Forest? _____
- What do you notice about the bar graph? _____

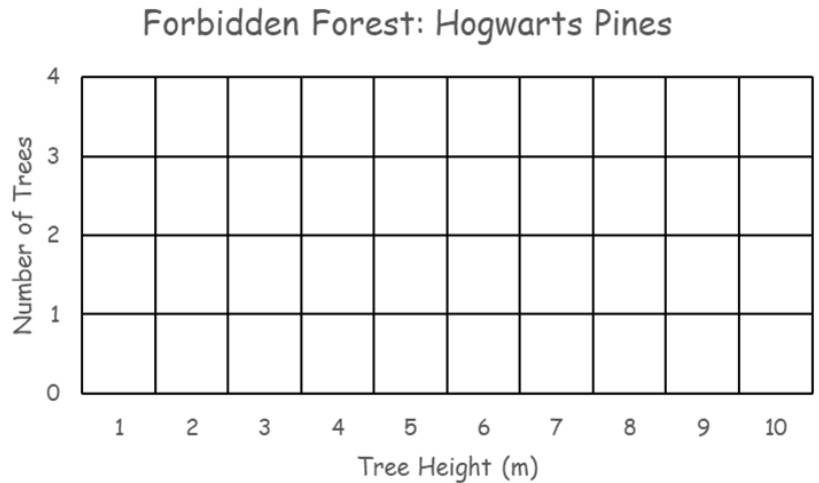
- What is the most likely height for an Azkaban Oak in the Forbidden Forest? _____
- Are you surprised that the Azkaban Oaks are different heights even though they are in the same environment and the same age? Why or why not? _____



Forbidden Forest: Hogwarts Pine Study

Tree Number	Height (m) 1 cm = 1 m
1	
2	
3	
4	
5	
6	
7	
8	
9	

Graph the data you collected below.



9. Are all of the Hogwarts Pines the same height in the Forbidden Forest? _____
10. What is the height of the tallest Hogwarts Pine in the Forbidden Forest? _____
11. What is the height of the shortest Hogwarts Pine in the Forbidden Forest? _____
12. What is the range in heights (height of tallest tree – height of shortest tree) of
Hogwarts Pines in the Forbidden Forest? _____
13. What do you notice about the bar graph? _____

14. What is the most likely height for a Hogwarts Pine in the Forbidden Forest? _____
15. Why aren't the Hogwarts Pines the same size as the Azkaban Oaks? _____



16. Predict if the following trees are Azkaban Oaks (AO) or Hogwarts Pines (HP).

A tree that is 8 m tall. Tree Type: _____

Why do you think it is that type of tree? _____

A tree that is 4 m tall. Tree Type: _____

Why do you think it is that type of tree? _____

17. The key findings of your study in the Forbidden Forest are:

- In the Forbidden Forest, the Hogwarts Pines grow _____ than the Azkaban Oaks.
- There are _____ Hogwarts Pines than Azkaban Oaks.
- Azkaban Oaks have a _____ range of heights than Hogwarts Pines.

Part 2: Tree Study—Enchanted Forest

Word got out about the excellent work that you did in the Forbidden Forest! The Enchanted Forest, which has the same type of trees, has asked you to repeat the study for them. Similar to the study in the Forbidden Forest, the Enchanted Forest picked a section of the forest (seen below) where all of the trees are the same age.



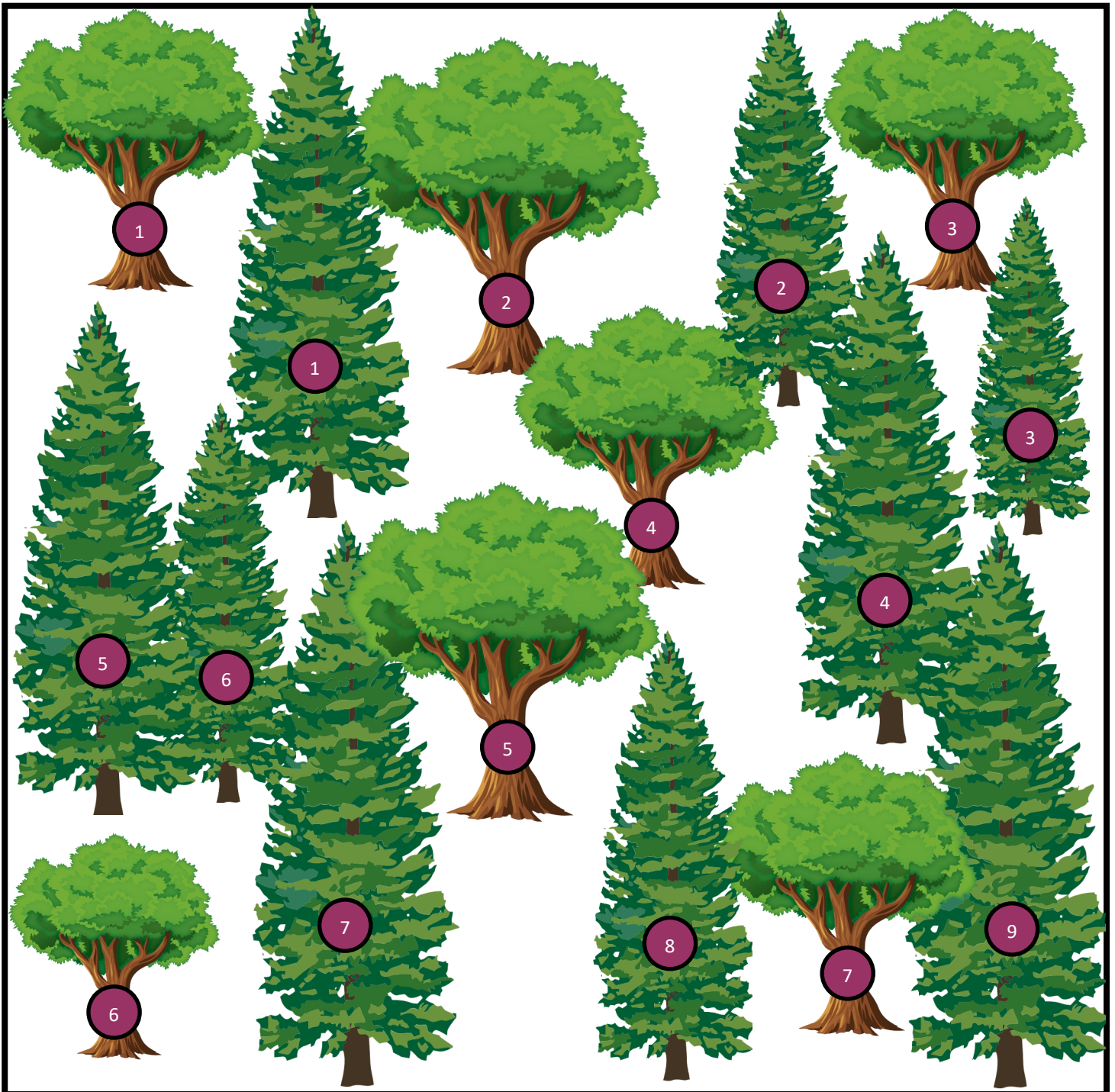
Azkaban Oaks



Hogwarts Pines

In the picture 1 cm = 1 m, measure the trees to the nearest cm.

Research Section of Enchanted Forest



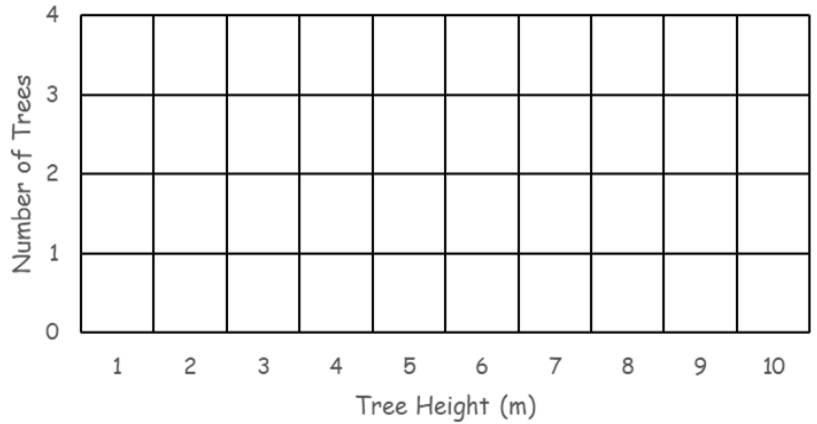


Enchanted Forest: Azkaban Oak Study

Graph the data you collected below.

Tree Number	Height (m) 1 cm = 1 m
1	
2	
3	
4	
5	
6	
7	

Enchanted Forest: Azkaban Oaks



18. Are all of the Azkaban Oaks the same height in the Enchanted Forest? _____

19. What is the height of the tallest Azkaban Oak in the Enchanted Forest? _____

20. What is the height of the shortest Azkaban Oak in the Enchanted Forest? _____

21. What is the range in heights (height of tallest tree—height of shortest tree) of Azkaban Oaks in the Enchanted Forest? _____

22. What is the most likely height for an Azkaban Oak in the Enchanted Forest? _____

23. Compare the graphs of the Azkaban Oaks from the Forbidden Forest and the Enchanted Forest. What do you notice that is similar? _____

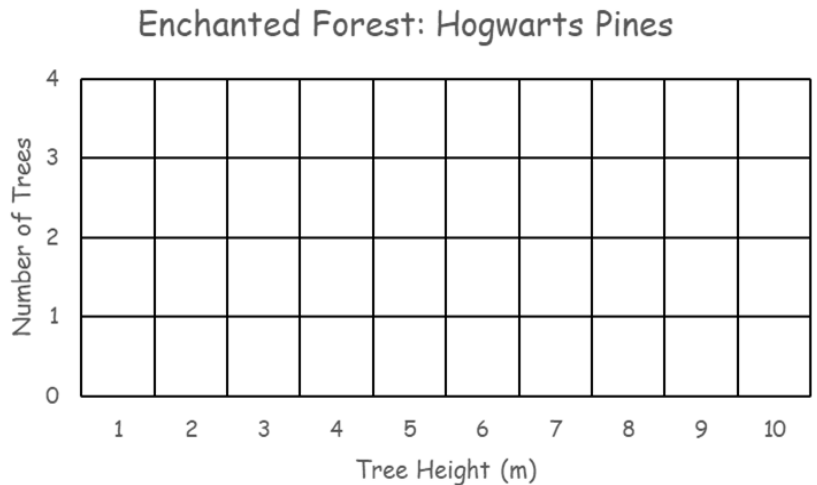
What do you notice that is different? _____



Enchanted Forest: Hogwarts Pine Study

Tree Number	Height (m) 1 cm = 1 m
1	
2	
3	
4	
5	
6	
7	
8	
9	

Graph the data you collected below.



24. Are all of the Hogwarts Pines the same height in the Enchanted Forest? _____

25. What is the height of the tallest Hogwarts Pine in the Enchanted Forest? _____

26. What is the height of the shortest Hogwarts Pine in the Enchanted Forest? _____

27. What is the range in heights (height of tallest tree—height of shortest tree) of
Hogwarts Pines in the Enchanted Forest? _____

28. What is the most likely height for a Hogwarts Pine in the Enchanted Forest? _____

29. Compare the graphs of the Hogwarts Pines from the Forbidden Forest and the
Enchanted Forest. What do you notice that is similar? _____

What do you notice that is different? _____



30. Predict if the following trees are Azkaban Oaks (AO) or Hogwarts Pines (HP) and if they grow in the Forbidden Forest (FF) or the Enchanted Forest (EF).

A tree that is 2 m tall. Tree Type: _____ Forest _____

Why do you think it is that type of tree growing in that forest? _____

A tree that is 9 m tall. Tree Type: _____ Forest _____

Why do you think it is that type of tree growing in that forest? _____

31. What are the key findings of your study in the Enchanted Forest?

- In the Enchanted Forest, the Hogwarts Pines grow _____ than the Azkaban Oaks.
- There are _____ Hogwarts Pines than Azkaban Oaks.
- Azkaban Oaks have a _____ range of heights than Hogwarts Pines.
- Trees grow _____ in the Enchanted Forest compared to the Forbidden Forest.

Part 3: Where Do Traits Come From?

Hermione and Ron are both third graders at Pigwarts Elementary School, a preparatory school for Hogwarts. One day at recess, Hermione invited Ron to play quidditch with her. Ron said, "No, I'm not good at quidditch, and I never will be."



"Why do you think you'll never be good at quidditch?" asked Hermione.

Ron sighed and admitted, "Well, I wasn't born to play sports. No one in my family is good at them. The people in my family are better at casting spells."

"That's silly!" exclaimed Hermione. "If you want to play quidditch, you just practice and that's how you learn!"

Ron shook his head, and explained, "No, that's not true. We are born to be a certain way, so I will never be able to play quidditch. For example, I have blue eyes that I was born with. Do you think I could just *practice* having brown eyes and then they would magically turn brown?"

Hermione scratched her head. "Hmmm, I guess that is true."

"Yeah!" Ron exclaimed. "I also have red hair and you have brown hair. That's another example, I just can't wake up tomorrow and have brown hair, can I?"



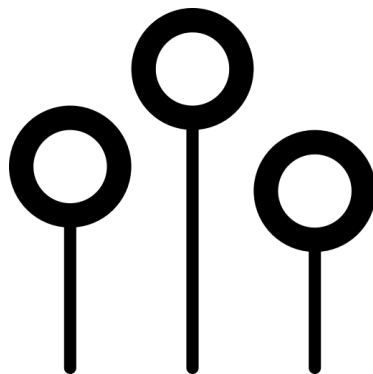


Hermione stood silent for a moment, but then suddenly had a thought. "Well remember when we started school here in Kindergarten? We couldn't read or write very well because we were little, but the teachers taught us how! Now we read and write all the time! See, you aren't just born knowing how to do things, you have to learn them."

Now Ron was the one left confused. "Well, that's true, but still there are some things that you can't really learn to do, like change your eye color. I think that for the most part, we are born with the different traits we have."

"Fine," said Hermione, "if you are too chicken to play quidditch, so be it. I think that we can learn traits from practicing and from other people and it doesn't really matter what you're born with."

Ron just shrugged and went over to go play on the swings, and Hermione continued to play quidditch.



32. A **claim** is a statement a person makes about the way something in the world works. For example, the larger the fish, the farther it swims. In this story, Ron and Hermione have both made **claims** about the different traits that they have. Fill in the claims that they made about traits.



Ron's Claim



Hermione's Claim

33. In order for a **claim** to be valid, it must be based on evidence that they have researched, observed, or measured. Each character also provides a few examples of why they think they are correct. These examples are the **evidence** they are using to support their **claim**. Fill in the evidence they stated to back up their claim.



Ron's Evidence



Hermione's Evidence

Part 4: Science Study of Tree Heights in Different Forests

After recess, Ron and Hermione went back to their class for science time. Their teacher, Professor Sprout, explained they will read an article published by an arborist that has been doing a study on both the Forbidden Forest and the Enchanted Forest.

Tree Heights in the Forbidden and Enchanted Forests

Azkaban Oaks and Hogwarts Pines grow in both the Forbidden and Enchanted Forests. The heights of the trees are given in Table 1.

Table 1: Tree Heights

Tree Type	Forbidden Forest		Enchanted Forest	
	Average Height	Height Range	Average Height	Height Range
Azkaban Oak	3 m	2 m	5 m	2 m
Hogwarts Pine	6 m	4 m	9 m	4 m

In both forests, Hogwarts Pines are taller than Azkaban Oaks. Another key difference between the species is that Hogwarts Pines have a greater range of heights than the Azkaban Oaks. This suggests that while the trees inherit an approximate height from their parents, there is a range of heights that the trees can reach. In general, trees also grow taller in the Enchanted Forest than in the Forbidden Forest.

We believe the difference in tree heights measured in the Forbidden and Enchanted Forests is caused by two factors. Factor 1 is the amount of rainfall: the greater the rainfall, the taller the trees. If there is more rainfall, the trees are able to absorb more water, making them taller. The average rainfall in the Forbidden Forest is 28 cm, while in the Enchanted Forest it is 109 cm, which causes the trees to be taller in the Enchanted Forest.

Factor 2 is temperature: the hotter the temperature, the shorter the trees. As temperature increases, more water evaporates from the ground, which reduces the amount of water for the trees, thereby making the trees shorter. The average temperature in the Forbidden Forest is 24°C (76°F), and in the Enchanted Forest is 20°C (68°F), which causes the trees in the Forbidden Forest to be shorter.

These findings show that environmental factors can play a role in the height a tree reaches. To verify our conclusions, we took an Azkaban Oak and a Hogwarts Pine seed from the Enchanted Forest and planted them in the Forbidden Forest. We then measured the heights of the trees when they were the same age as the trees in the original study. We found the heights to be 4 m for the Azkaban Oak and 5 m for the Hogwarts Pine, which were closer to the Forbidden Forest heights than the Enchanted Forest heights. This shows that the environment played a role in the height differences.

34. Trees are taller in the: Forbidden Forest Enchanted Forest

What claims did the arborist make about why the trees were different heights in the two forests and what data backs up those claims?

Claim 1: _____

Data Forbidden Forest: _____ Data Enchanted Forest: _____

Claim 2: _____

Data Forbidden Forest: _____ Data Enchanted Forest: _____

After reading and discussing the article it was time for lunch. At lunch Ron and Hermione discussed how the tree study applied to their argument about quidditch and if it was a learned or inherited trait.

35. Ron argued that traits are inherited learned.

36. What evidence do you think Ron could use from the tree study to support his argument that traits are inherited? _____

37. Hermione argued that traits are inherited learned.

38. What evidence do you think that Hermione could use from the tree study to support her argument that traits are learned? _____

Part 5: Where Our Traits Come From

After lunch, Ron and Hermione went back to their third grade class for more science time. Professor Sprout explained that they would be reading an article about what makes you who you are.

Ron and Hermione gasped and looked at each other. Finally, they would know who was right! Professor Sprout passed out the article, and the whole class read it together.

What Makes You Who You Are?

Every person is different. We all have a combination of two types of traits.

Inherited traits are characteristics that we are born with. We inherit traits from our parents. Some examples of inherited traits are the color of our hair and eyes.

Acquired traits are things that are learned, or are influenced by the

environment that we live in. It is not always easy to tell which traits are inherited, and which are acquired.



In fact, scientists have evidence that some traits may be a combination of both. Sometimes we start out with an inherited trait that we develop because of what we learn. For example, you may have inherited artistic ability from your mom, but it is up to you to use your ability to create great art. Some people are born with a calm, quiet personality, and some people are more outgoing and energetic. A calm, quiet person can be pleasant and a good listener. An outgoing, energetic person can be entertaining to others. But both of these people can also have problems if they don't work with their traits in a positive way. A quiet person can become withdrawn and awkward and an outgoing, energetic person can demand too much attention and forget about others.

Some acquired traits come from observing family members or others around us. For example, if your parents play musical instruments, you may become interested in learning about music as well. This is not always the case, though. Perhaps your dad likes to cook but you will never be interested in cooking, or perhaps your mom plays golf but you would rather be a skateboarder. You may also acquire interests because of the environment in which you grow up. Someone who grows up near the beach is more likely to be interested in swimming than someone who grows up in a cold mountain environment where many people enjoy skiing.

Part of the challenge in growing up and becoming you is learning to like who you are. This is easy if you are like most of the people around you. But what if you are different in some way? Sometimes it's hard to be different if you feel like there is something wrong with that. But there is nothing wrong with being different and every person has traits that are different from others. If we were all the same, the world would be a boring place! If you learn to like yourself, you will be happier being yourself. If there are things you do not like about yourself, you can work to change those things, if possible. Some traits cannot be changed. You can also learn to accept all or most of your traits.

After reading the article, Ron turned to Hermione and said, "Hmm, well maybe I will try to play quidditch with you tomorrow!" They both smiled and laughed, knowing that they learned something new about themselves.

39. Where do all living things get their traits? _____

40. Is tree height an inherited or acquired trait?

Claim: Tree height is _____ trait

Evidence: _____

