

# Development of Theories

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## CHAPTER

## 1

# Development of Theories

- Define the terms theory and law as they are used in science.



## Do you have a theory about this couple?

“My theory on why she doesn’t want to go out with him any more is that he won’t let her see her friends.” While that might be why she doesn’t want to go out with him, the idea is not a theory. In common speech, the word theory is often misused. It is sometimes misused when referring to scientific ideas as well. What would be a better word to use?

## Theory

Scientists seek evidence that supports or refutes a hypothesis. If there is no significant evidence to refute the hypothesis and there is an enormous amount of evidence to support it, the idea is accepted. It may become a theory.

A scientific **theory** is strongly supported by many different lines of evidence. A theory has no major inconsistencies. A theory must be constantly tested and revised. A theory provides a model of reality that is simpler than the phenomenon itself. Scientists can use a theory to offer reliable explanations and make accurate predictions.

A theory can be revised or thrown out if conflicting data is discovered. However, a longstanding theory that has lots of evidence to back it up is less likely to be overthrown than a newer theory. But science does not prove anything beyond a shadow of a doubt.




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## Laws

Many people think that any idea that is completely accepted in science is a law. In science, a **law** is something that always applies under the same conditions. If you hold something above the ground and let go it will fall. This phenomenon is recognized by the law of gravity. A law explains a simpler phenomenon or set of phenomena than does a theory. But a theory tells you why something happens and a law only tells you that it happens.

Amazingly, scientific laws may have exceptions. Even the law of gravity does not always hold! If water is in an enclosed space between a hillside and a glacier, the weight of the glacier at the bottom of the hill may force the water to flow uphill - against gravity! That doesn't mean that gravity is not a law. A law always applies under the right circumstances.




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## Summary

- In science, a theory is an explanation of a much more complex phenomenon than a law describes. A theory tells why something happens.
- A theory can be used to predict future events.
- A law describes something that always happens under the same set of circumstances, but not why it happens. But even laws do not always hold.

## Review

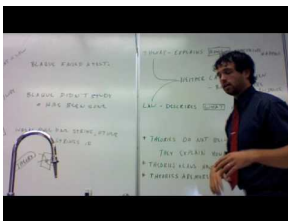
1. Compare and contrast hypothesis, theory, and law.
2. Can a theory become a law or a law become a theory? Can a hypothesis become a law or a theory?
3. Which of these, if any, is more important in science: hypothesis, theory, or law?

## Explore More

Use this resource to answer the questions that follow.

**FIGURE 1.1**

The Leaning Tower of Pisa in Italy only appears to defy gravity.

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1. What does a scientific theory do?
2. What does a scientific law describe?
3. What is the relationship between theories and laws?

4. Why are theories more useful than laws?
5. Under what circumstances will a theory become a law?

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## References

1. Sébastien Bertrand. [The Leaning Tower of Pisa in Italy only appears to defy the law of gravity](#) . CC BY 2.0