

# How to Write a Testable Question



phillipmartin.info

Sometimes scientists just like to explore...



Exploring or making observations often makes scientists curious about specific questions.

To answer these questions, most scientists carry out investigations.



# What is a “Testable Question?”

A testable question is one that can be answered by designing and conducting an experiment.



# What is a “Testable Question?”

Testable questions are always about changing one thing to see what the effect is on another thing.

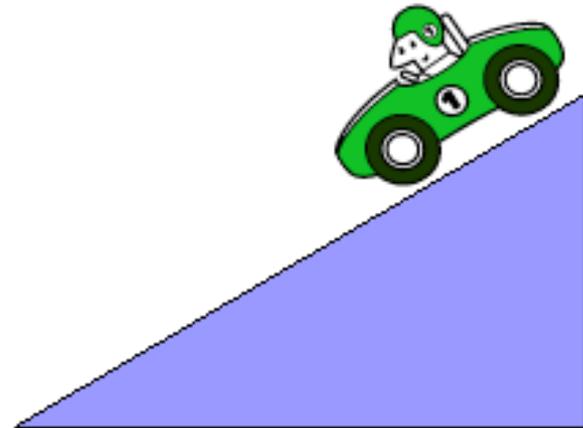
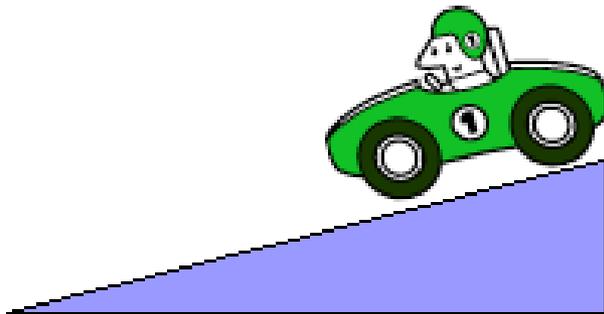


# Sample Testable Question

Does changing the height of the ramp

affect

the speed of a car going down the ramp?



# Testable Question Formats

- Does changing \_\_\_\_\_ affect \_\_\_\_\_?
- How does changing \_\_\_\_\_ affect \_\_\_\_\_?
- If I change \_\_\_\_\_, will it affect \_\_\_\_\_?



In a scientific experiment, these two blanks have special names: **variables**

# What is a variable?

A variable is something that can **CHANGE**.

# Testable Questions have two parts:

- An independent variable
- A dependent variable



# What is an Independent Variable?

- The variable that will be changed by you - the scientist.

A good experiment has only one  
independent variable!

# What is a Dependent Variable?

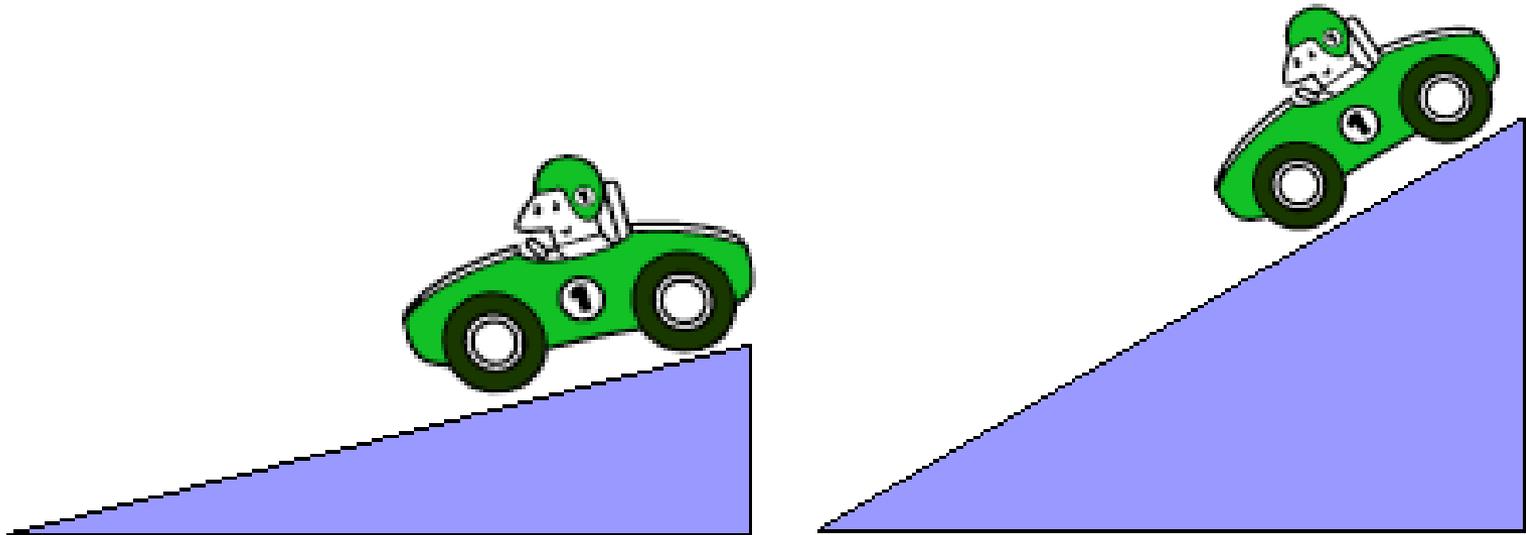
- The variable that is being measured in your experiment
- The response to the change you make using the independent variable.

# Testable Question Formats

- Does changing independent variable affect dependent variable?
- How does changing independent variable affect dependent variable?
- If I change independent variable will it affect dependent variable?

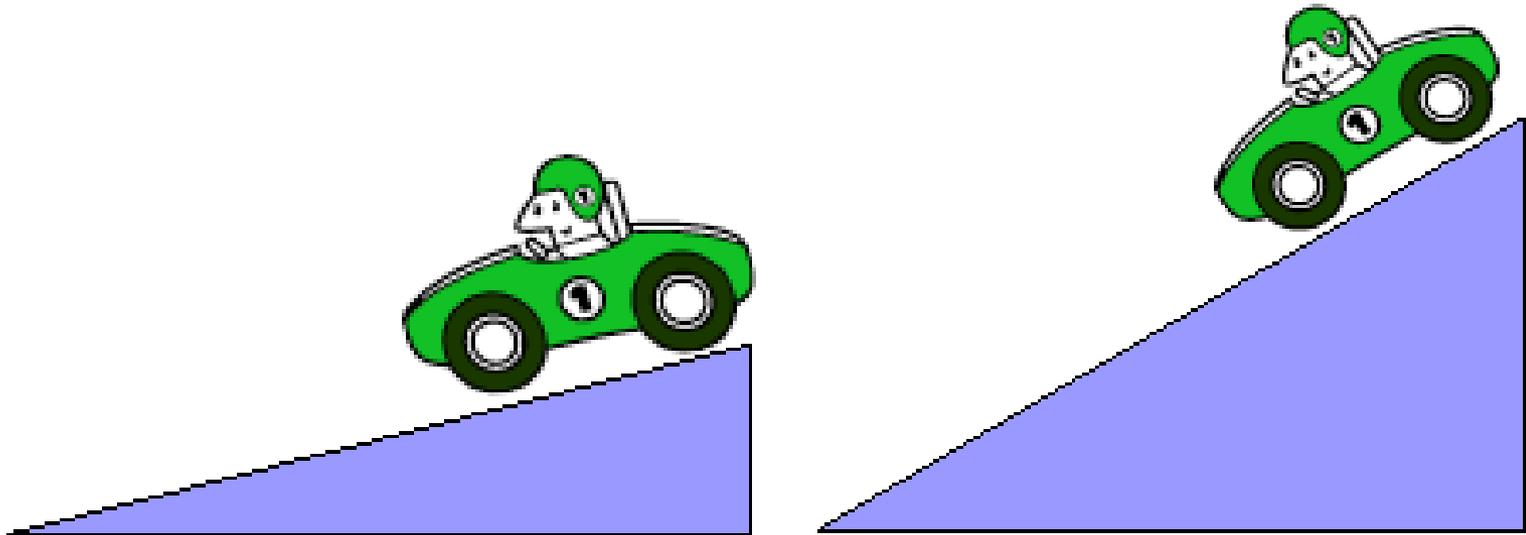
# Example:

- Does changing the height of the ramp affect the speed of the car going down the ramp?



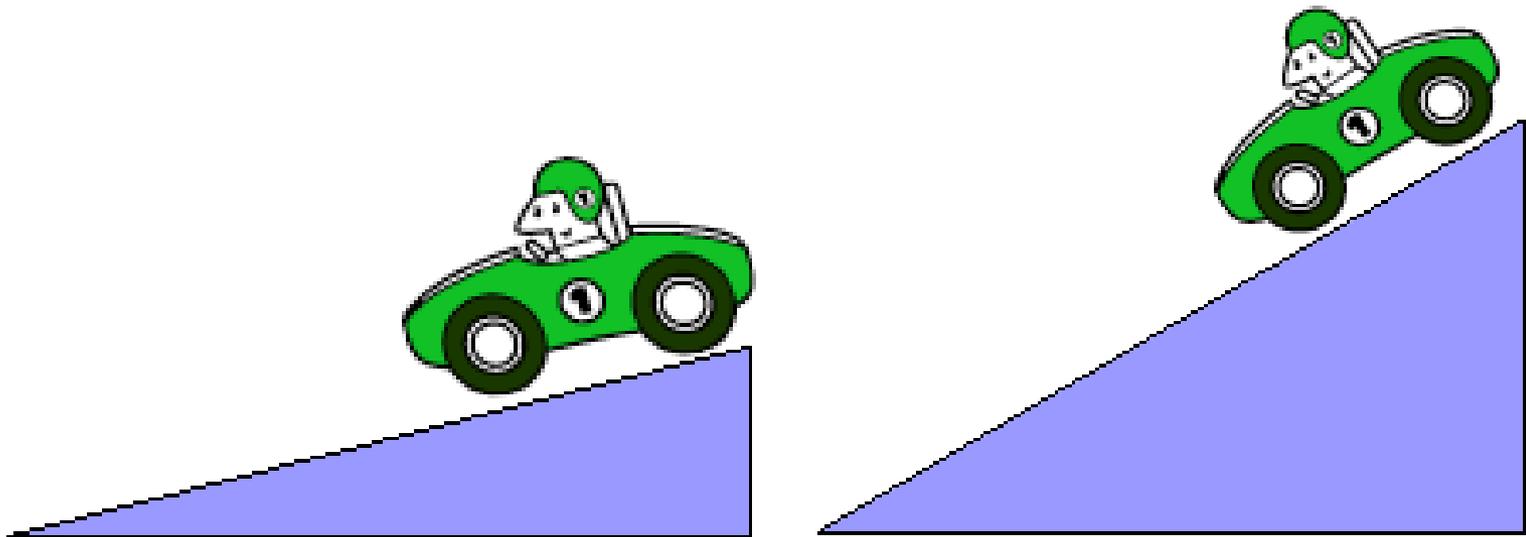
# What is the independent variable?

- Does changing the height of the ramp affect the speed of the car going down the ramp?



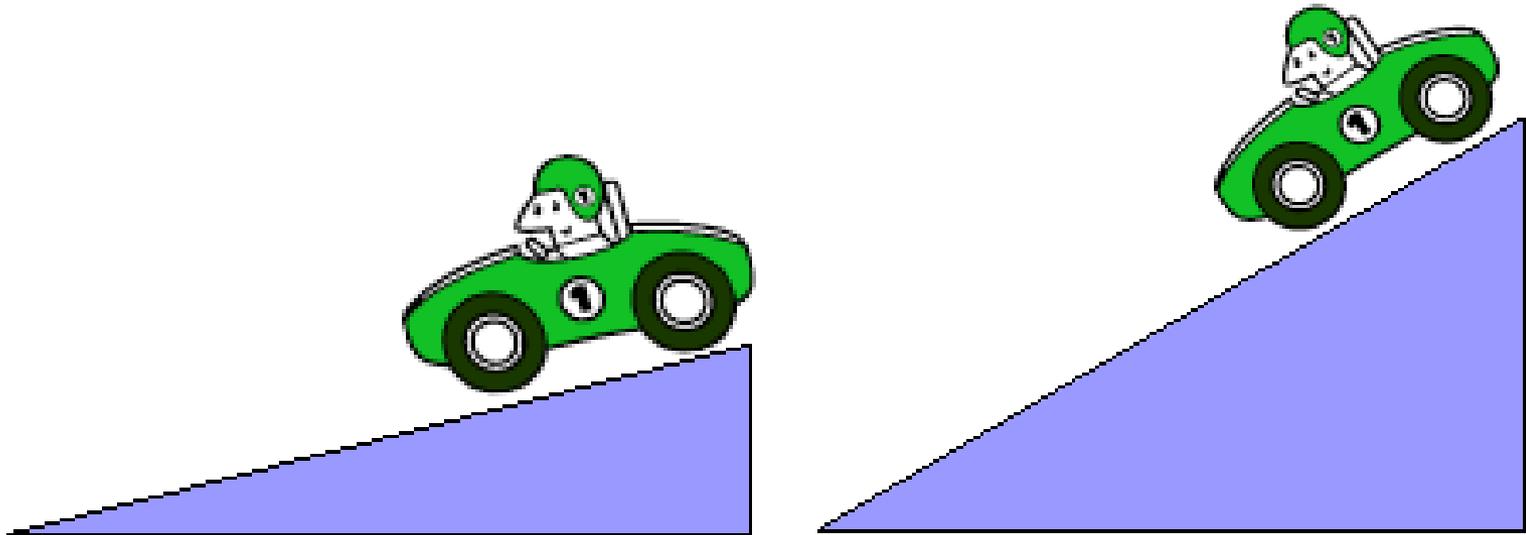
# Independent Variable

- Does changing **the height of the ramp** affect the speed of the car going down the ramp?



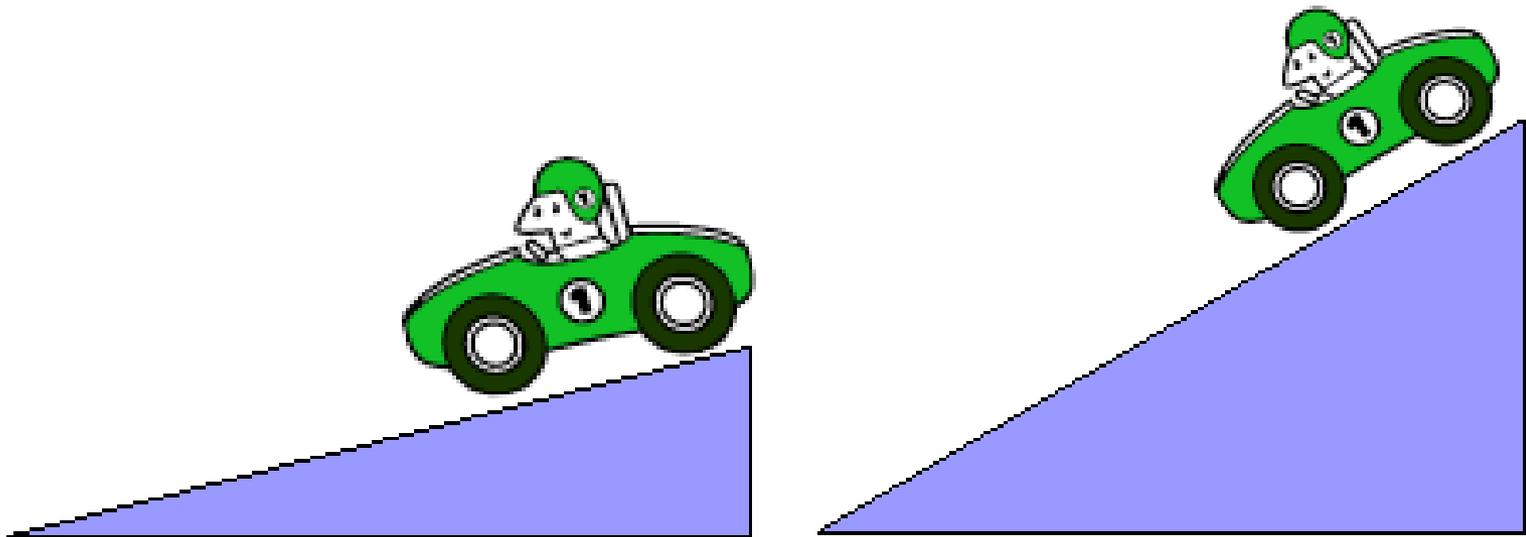
# What is the dependent variable?

- Does changing the height of the ramp affect the speed of the car going down the ramp?



# Dependent Variable

- Does changing the height of the ramp affect the speed of the car going down the ramp?

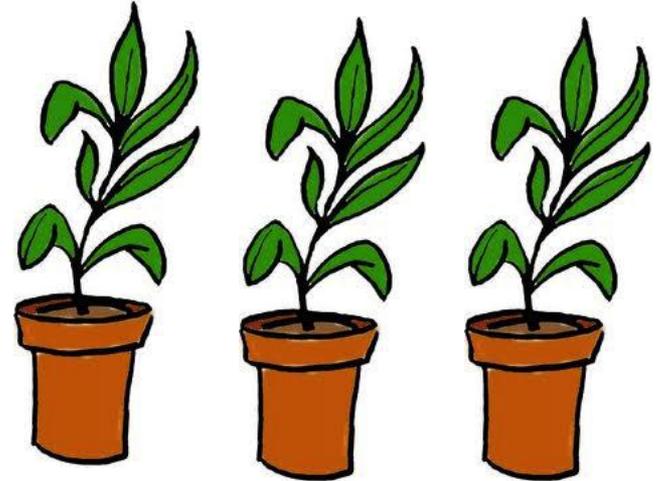


# Another Testable Question

- Does changing the amount of light affect the growth rate of plants?

Identify the INDEPENDENT variable

Identify the DEPENDENT variable



# Another Testable Question

- Does the temperature of water affect the time it takes a sugar cube to dissolve?

Identify the INDEPENDENT variable

Identify the DEPENDENT variable



# Review: Testable Questions

Testable Questions need 2 parts:

(1) \_\_\_\_\_ variable

(2) \_\_\_\_\_ variable

# Review: Testable Questions

Testable Questions need 2 parts:

(1) Independent variable

(2) Dependent variable



Is this a Testable Question?

What makes plants grow best?



# How to Turn a General Question into a Testable Question

First, read the question carefully.

What makes plants grow best?



# How to Turn a General Question into a Testable Question

Next, think of a **cause** and an **effect** related to your question.

What makes plants grow best?

In this case, the idea is that you can change something to affect something about how a plant grows.



What are examples of things  
you can change?

What makes plants grow best?



# What are examples of things you can change?

What makes plants grow best?

Examples:

- Amount of water
- Amount of light
- Soil type



What specific effects  
can you look for?

What makes plants grow best?



# What specific effects can you look for?

What makes plants grow best?

Examples:

- Height of plant
- Speed of growth



Finally, plug the cause and the effect into the format...

“What is the effect of \_\_\_\_\_ on \_\_\_\_\_?”

The cause goes in the first blank, and the effect goes in the second blank.

So a testable question looks like this:

“What is the effect of soil type on plant height?”



# Controls

Controls are all the factors in your experiment that you want to remain constant.

“What is the effect of soil type on plant height?”

Controls for the plant experiment:

- type of plant
- growing conditions (sunlight, temperature, etc.)
- amount of water
- type of container



Here's another example...  
Is it Testable?

How does a paper airplane fly?



# Let's Make the Question Testable!

- Decide what you are going to change (independent variable)



# Let's Make the Question Testable!

- Decide what you are going to change (independent variable)

For example:

- Size of the plane
- Style of the plane
- Type of paper



# Let's Make the Question Testable!

- Decide what you are going to measure (dependent variable)



# Let's Make the Question Testable!

- Decide what you are going to measure (dependent variable)

For example:

- Distance the plane will fly
- Length of time the plane stays in the air



# Make the Question Testable

- Now select one independent variable and one dependent variable
- Put them together to create the testable question:

"How does the type of paper affect the distance a paper airplane flies?"



# What are the controls?

"How does the type of paper affect the distance a paper airplane flies?"

Controls:

- Style of airplane
- Flying conditions (wind)
- How you throw the airplane



# Final Thoughts

- Keep your experiment simple and clear
- Check out the library or our web links for ideas
- Don't wait! Some projects take time to do.