Name: _____ Packet Due Date: _____

Science

Module 1	**The Nature of Science**
Part 1	**What is Science?** (Standards: Scientific Practices SP.7 & SP.8)



Lessons & Objectives

Lesson 1: What is an Illusion?

- ❑ **I can…** explain the meaning of the term illusion.

Lesson 2: What is Science?

- ❑ **I can…** develop a working definition of science.
- ❑ **I can…** determine whether a novel scenario describes real science.
- ❑ **I can…** identify and explain the six characteristics of science and describe whether a scenario describes real or false science.

Packet Completion Rubric

4	3	2	1	0
Nothing in packet is missing. Responses consistently meet ALL of the criteria for high quality work. Exemplary effort is evident throughout entire packet.	Packet is 75-100% complete/accurate. Work/effort misses the criterion for high quality consistently.	Packet is 50-75% complete/accurate. Work/effort has evidence of quality but not consistently.	More than 50% of the packet is incomplete or incorrect. Work does not meet the expected level of quality.	Packet is entirely incomplete or not turned in.

Grading Breakdown: 0 - 1.9 = F 2 - 2.4 = D 2.5 - 2.9 = C 3 - 3.4 = B 3.5 - 4 = A

Lesson 1: What is an Illusion?

Objective: I can explain the meaning of the term *illusion*.

What Do You Already Know?
Science Knowledge Survey

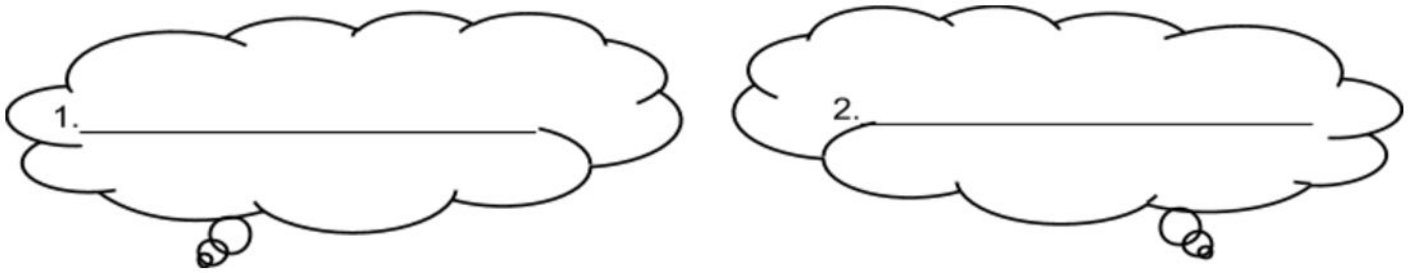
Statement	Agree	Disagree
1. Science can solve all types of problems or questions.		
2. Science is mostly concerned with understanding how the natural world works.		
3. Science is primarily a collection of facts.		
4. Astrology (predicting the future from stars and planets) is a type of science.		
5. Science requires creative thinking.		
6. Scientific ideas can be temporary or tentative.		
7. The scientific method is a set of steps that must be followed the same way in every scientific investigation.		
8 Science can be subjective (influenced by personal feelings and experiences).		
9. Science and religion oppose one another. In other words, a good scientist cannot be religious and vice versa.		
10. Scientists have solved most of the major mysteries of nature.		

Your Score: ____ / 10

Big Picture

In Unit 1, we'll learn more about each statement in the *Science Knowledge Survey* and develop a better understanding for why each is true or false.

Along the way, we'll uncover the answers to two **HUGE** essential questions:



Think, Pair, Share: What do you think is meant by the following statement?
"Perception is not always reality."



Illusion: Something that _____ (or tricks) the mind or senses.

Lesson 2: What is science?

Objectives: I can develop a working definition of *science*.
I can determine whether a novel scenario describes real science.
I can identify and explain the six characteristics of science and describe whether a scenario describes real or false science.

So how does this discussion of "illusions" relate to science???

Science attempts to _____ behind illusions.

Science is a process by which we try to understand how the _____ works and how it came to be that way.

Think, Pair, Share:
What do you think the cartoonist is trying to communicate?

My ideas: _____

_____

_____

_____

_____

My partner's ideas: _____

_____

_____

_____

"It's either possessed by a demon or the air-intake valve is clogged. It's almost impossible to tell the difference without taking it apart."

Limits to Science

Science can only deal with the _____ world. In other words, science seeks to explain phenomena that can either be _____ or _____ (using instruments) observed.



Limits to Science (continued…)

Science is often confused with other fields that attempt to explain the world…

<u>Religion</u>:

Seeks to explain the world through _____ and _____.

<u>Pseudoscience (false science)</u>:

Often portrayed as legitimate science, but it lacks _____ _____ or cannot be _____ _____ (examples: *astrology, creation science*)

Science? Or not?

Let's find out if you can identify <u>REAL science</u> from <u>not-so-real science</u>! The following article summarizes a recent weight loss study. Read the article and then decide if you think it describes a <u>scientific</u> study.

Has the world gone coco? Eating chocolate can help you LOSE weight

GOOD news slimmers! New research claims that eating chocolate can actually help you beat the bulge.

By Laura Mitchell/Published 30th March 2015

Share Tweet

It's the diet that everyone has been waiting for. A German study has found that eating chocolate can reduce your waistline, lower your cholesterol and help you sleep.

The study, published in the International Archives of Medicine, revealed that chocolate is a rich source of bioactive compounds – a plant compounds associated with several positive health impacts. To test its effects researchers divided volunteers aged 19 to 67 into three groups.

One group followed a strict low-carbohydrate diet, another group followed the low-carbohydrate diet and also consumed 42 grams of dark chocolate per day, and a control group followed their normal diet. Besides tracking their body weight and measuring blood chemistry before, during and after, participants filled out questionnaires to assess sleep quality and well-being.

As predicted, the low-carb group lost weight compared to the control. But shockingly, the low-carb plus chocolate group lost 10 per cent more weight. Not only that, but the weight they lost stayed off. Whereas the low-carb group saw a return of the weight after three weeks — a classic problem known as the "yo-yo effect". The chocolate group also reported better sleep and well-being, and their blood cholesterol levels were significantly reduced.

Johannes Bohannon, research director of the nonprofit Institute of Diet and Health, said: "To our surprise, the effect of chocolate is real "It is not enough to just consume chocolate, but in combination with exercise and reduction in carbohydrates, our data indicate that chocolate can be a weight loss accelerator. The researchers suggest that high-cocoa chocolate has the potential to enhance other diets as well."

How can we identify real science?

THE SIX CHARACTERISTICS OF SCIENCE

1. **Consistent** *(scientific results for a study are repeatedly similar)*
2. **Observable** *(information can be observed and explained)*
3. **Natural** *(deals with the natural world)*
4. **Predictable** *(reasonable predictions can be made)*
5. **Testable** *(ideas can be tested)*
6. **Tentative** *(theories can be revised)*

Remember: **"CONPTT"**

THE SIX CHARACTERISTICS OF SCIENCE	
Characteristic	***Circle the Correct Example***
Consistent: The results of repeated observations and/or experiments are reasonably the _____ when performed and repeated _____ times.	1. Green plants will grow towards a light source. 2. Walking under a ladder will cause bad luck.
Observable: The event being studied, or evidence collected from the event, can be _____and explained. The observations are limited to the basic human _____ or to extensions of the senses such as the use of a microscope.	1. Some plants eat meat. 2. Extraterrestrial beings exist.
Natural: A _____ _____ must be used to explain why or how the naturally occurring event happens. Scientists may NOT use _____ explanations as to why or how naturally occurring events happen because reference to the supernatural is outside the realm of science.	1. Green plants convert sunlight into energy. 2. A supreme being is responsible for the diversity of life on Earth today.
Predictable: The natural cause of the naturally occurring event can be used to make specific _____. Each prediction can be _____ to determine if the prediction is true or false.	1. If the patient takes drug A, cancer growth will slow. 2. If the patient is a Scorpio, he will experience a positive shift in health in August.
Testable: The natural cause of the naturally occurring event must be _____through the process of science (controlled experimentation). Reference to _____ events or causes are not relevant tests.	1. Adults that consume at least 60 mg of sugar per day are at a greater risk of developing diabetes. 2. Albert Einstein was one of the top 5 smartest humans to have lived.
Tentative: Science is subject to _____ and _____. Scientific theories have been _____ and will continue to be modified as new evidence is collected. (In an attempt to find the best explanation!)	1. We know the world began around 6000 years ago. There is no evidence that can ever refute that. 2. Living things were once grouped into 2 major categories, then 3, then 4, and now 5 because the criteria for grouping living things has changed.

IMPORTANT NOTE!
(about how to use the 6 Characteristic of Science in a scientific argument)

In order to determine if something can be considered real, authentic science or not,
_____ _____ _____ **must be satisfied!**

Practicing Argumentative Writing with CERs
(Claim, Evidence, Reasoning)

Does the scenario you've been given describe real, authentic science?

Develop an argument to answer the question above. Your argument should include the following three components. Use the rubric at the bottom to guide your thinking and writing.

1. **Claim** *(1 sentence)*: Answer the question above.
2. **Evidence** *(2 sentences)*: What evidence supports your claim?
3. **Reasoning** *(2 sentences)*: How does each piece of evidence support your claim? Why did you choose this evidence?

_____

_____

_____

_____

_____

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_____

CER Writing Assessment Rubric - Adapted for Science

Rubric Categories	4	3	2	1	0
CLAIM TOTAL ____ /4	Writes a one-sentence claim that is clearly communicated, uses the language from the question, and accurately responds to the writing prompt. **Does not contain an "I" statement.**	Writes a correct one sentence claim that accurately responds to the writing prompt but **does not fully use the language from the writing prompt.**	Writes a claim sentence that **somewhat** responds to the writing prompt, but is **incomplete or disorganized.**	Writes a claim sentence that **does not respond to the writing prompt.** Claim may be **confusing, unclear, or inaccurate.**	*Claim is missing entirely.*
EVIDENCE TOTAL ____ /4	Selects multiple pieces of scientific evidence (facts, concepts, theories) or evidence from the prompt to **strongly** support the claim. The source of **each** piece of evidence is provided.	Selects multiple pieces of scientific evidence (facts, concepts, theories) or evidence from the prompt to **adequately** support the claim. The source of **most** pieces of evidence is provided.	Selects scientific evidence (facts, concepts, theories) or evidence from the prompt that **incompletely or vaguely** supports the claim. **Some evidence might be incorrect or inappropriate for the claim.** The source of evidence is **rarely provided or missing entirely.**	Selects evidence that **does not support** the claim.	*Evidence is missing entirely.*
REASONING TOTA ____ /4	**Clearly** explains the main idea of **each** piece of evidence in your own words using **precise** scientific language. **Clearly** explains how **each** piece of evidence supports the claim.	Explains the main idea of **each** piece of evidence in your own words using **scientific language.** Explains how **each** piece of evidence supports the claim.	Explains the main idea of **some** pieces of evidence in your own words. **Weakly** explains how **some** evidence supports the claim.	Reasoning is **unclear or confusing.** Reasoning **does not discuss the connection to the claim.**	*Reasoning is missing entirely.*
CONVENTIONS TOTAL ____ /2	X	X	**Adequate use** of correct sentence formation, organization, punctuation, capitalization, grammar usage, and spelling.	**Limited use** of correct sentence formation, organization, punctuation, capitalization, grammar usage, and spelling.	*CER is missing entirely.*
TOTAL ____ /14					

<u>Lesson 1</u> DO NOW	***Complete "Science Knowledge Survey" on page 1 of your packet***
<u>Lesson 1</u> EXIT SLIP	Illusions can be seen in nature as well. For example, our senses alone lead us to believe the earth is flat and unmoving. **Can you think of any illusions in nature**? <u>Develop a list of as many illusions in nature as you can think of.</u> _____ _____ _____ _____ _____ _____
<u>Lesson 2A</u> DO NOW	Look back on the list of illusions you developed at the end of yesterday's lesson. **Can you think of any other illusions in nature?** Turn and talk to you neighbor (quietly) and compare your lists. Share your ideas and continue to add to your lists. _____ _____ _____ _____ _____
<u>Lesson 2A</u> EXIT SLIP	Using what you've learned today and your prior knowledge, answer the following question <u>in your own words</u>: ***What is science?*** _____ _____ _____ _____ _____

Lesson 2B DO NOW	How do you think we can tell when something is real, true science? *(as opposed to another way of explaining the world, like pseudoscience or religion)* ***Compose a list of as many characteristics as you can think of to describe SCIENCE.*** _____ _____ _____ _____ _____
Lesson 2B EXIT SLIP	**Were you correct in your initial argument about whether or not the chocolate study described real science?** Use evidence from the video to support your response. _____ _____ _____ _____ _____
Lesson 2C DO NOW	***How can we identify real science?*** Make a list of at least 3 characteristics that all real science principles or ideas share. _____ _____ _____ _____ _____
Lesson 2C EXIT SLIP	***Complete your CER in the space provided on page 5 of your packet***