

Group Color: \_\_\_\_\_  
Subgroup Number: \_\_\_\_\_



## How Science Works

Grade 5

Module 1

*Class Question:*

Scientist (Your Name): \_\_\_\_\_

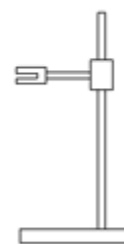
Teacher's Name: \_\_\_\_\_

SciTrek Volunteer's Name: \_\_\_\_\_

## VOCABULARY

**Science:** The study of the material world using human reason. The scientific method is the way humans reason and apply logic to data to help gain knowledge of the world.

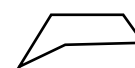
- **Observation:** A description using your five senses. This could include contents, mass, size, color, temperature, smell, texture ...
- **Opinion:** Something you believe or feel. Not a fact or observation.
- **Inference:** A guess based on past experiences.
- **Testable Question:** A question for which an experiment can be designed to answer.
- **Non-Testable Question:** A question for which an experiment cannot be designed to answer. For example, questions involving things that cannot be measured/ observed or things that are not well defined/opinions.
- **Experimental Set-Up:** The materials, changing variable, and controls that are needed for an experiment.
- **Experiment:** A test or trial to discover something unknown.
- **Procedure:** A set of steps to conduct an experiment.
- **Controls:** The variables that are not changed in an experiment.
- **Changing Variable (Independent Variable):** The variable that is purposely changed in an experiment.
- **Results/Data (Dependent Variable):** The measurements/observations of the experiment, which are influenced/determined by the changing variable.
- **Prediction:** What you expect to happen based off of previous measurements/observations.
- **Scientific Practices:** A series of activities that scientists participate in to both understand the world around them and to communicate their results with others. The specific practice worked on in this module is conclusions.
- **Technique:** A method for a specific task.
- **Conclusion:** A claim supported by data.
- **Claim:** A statement that can be tested. The explanation of the data; the first part of a conclusion.
- **Data:** Evidence collected from experiment(s) (measurements or observations); the second part of a conclusion.
- **Shadow:** An area where direct light cannot be reached because it is blocked by an object.
- **Light:** A form of energy that makes it possible to see things.
- **Ring Stand:** A device made from a metal pole with a solid firm base that is used to hold scientific equipment.
- **Clamp:** A device that can be installed on a ring stand to hold equipment such as flashlights.
- **Angle:** A measurement telling the separation between two lines that meet at one point.
- **Dimension:** A measurable extent of some kind, such as height, width, or length.
- **Symmetrical:** Made up of similar parts facing each other.



Ring Stand with Clamp



Symmetrical



Not Symmetrical

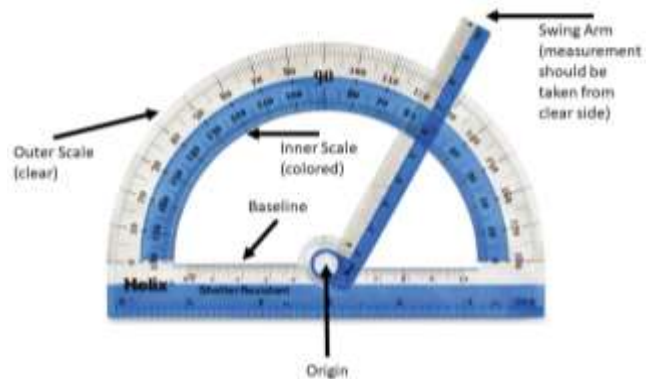
# TECHNIQUE

## Protractors

Protractors are used to measure and draw angles.

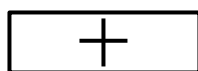
How to measure an angle using a protractor:

1. Line up the origin with the center point of the block and place the baseline parallel to the bottom of the block.
2. Move the swing arm to point to the center of the flashlight.
3. The angle is the value on the outer clear scale, on the clear side of the swing arm.



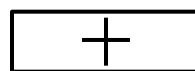
Identify the angle of the flashlight in relation to the box.

1.



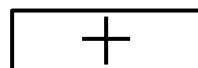
Angle: \_\_\_\_\_

2.



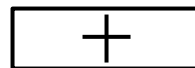
Angle: \_\_\_\_\_

3.



Angle: \_\_\_\_\_

4.



Angle: \_\_\_\_\_

# OBSERVATIONS

Experimental Set-Up:

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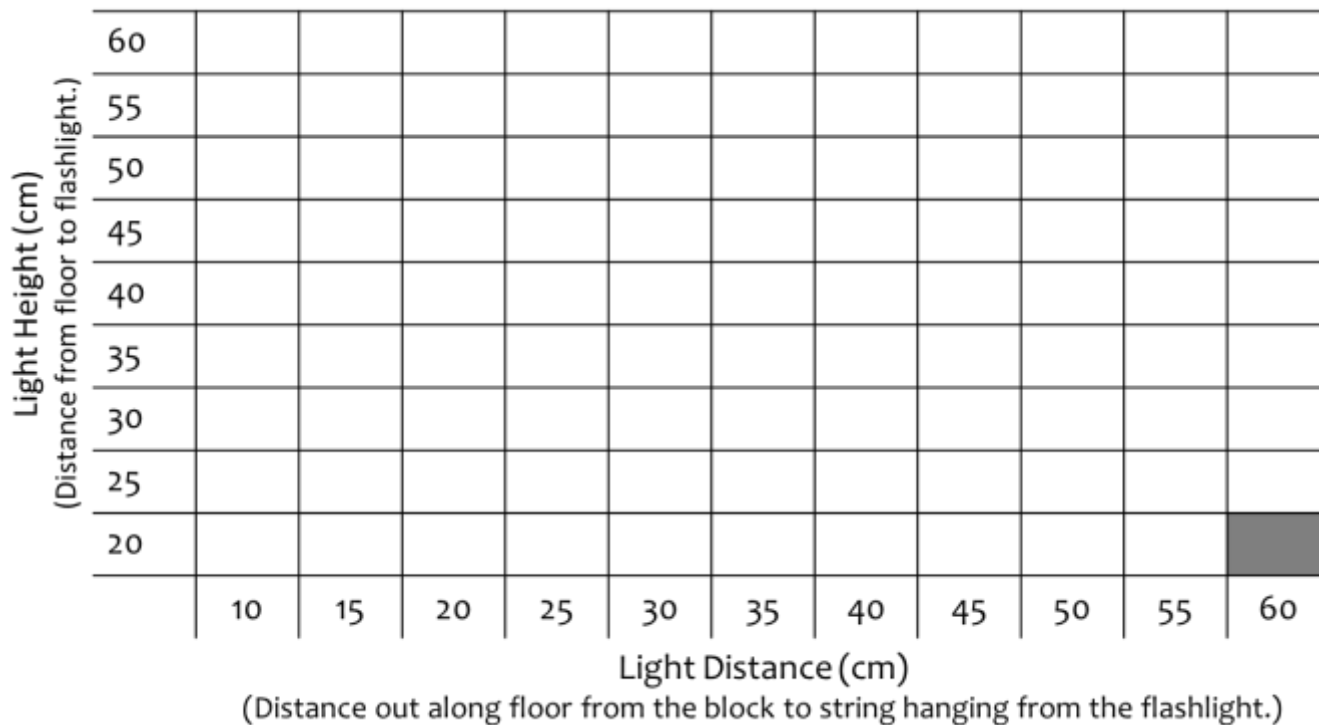
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On the chart below, color the box that indicates the light distance and light height.





## VARIABLES

Variable	How will changing this variable affect the shadows?
	<hr/> <hr/> <hr/>
	<hr/> <hr/> <hr/>
	<hr/> <hr/> <hr/>
	<hr/> <hr/> <hr/>
	<hr/> <hr/> <hr/>

## Experimental Considerations:

1. You will only have access to the materials on the materials page.
2. You will only have access to one flashlight with white light and the light must be focused and pointed directly at the center of the block.
3. All objects will be rectangular blocks and you will only be able to change one dimension of the block.

### Changing Variable(s) (Independent Variable(s))

You will get to perform two experiments. For your first experiment, decide which variable(s) (max three) you would like to test. For each changing variable you select, discuss with your subgroup why you think that variable will affect the shadow.

Changing Variable 1: \_\_\_\_\_

Discuss with your subgroup how you think **changing variable 1** will affect the shadow.

Changing Variable 2 (optional): \_\_\_\_\_

Discuss with your subgroup how you think **changing variable 2** will affect the shadow.

Changing Variable 3 (optional): \_\_\_\_\_

Discuss with your subgroup how you think **changing variable 3** will affect the shadow.

What will you measure? (circle one)      Shadow Length      Shadow Width

## QUESTION

Question our subgroup will investigate:

- If we change the \_\_\_\_\_  
insert each changing variable (independent variable)

\_\_\_\_\_ ,

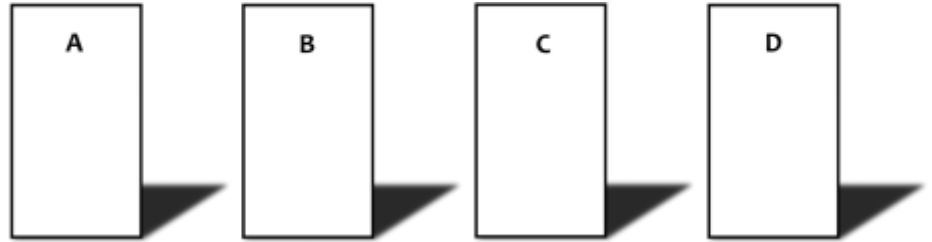
what will happen to the \_\_\_\_\_ ?  
insert what you are measuring/observing (dependent variable)

**SciTrek Member Approval:** \_\_\_\_\_

Get a materials page from your volunteer and fill it out before moving onto the experimental set-up.

## EXPERIMENTAL SET-UP

Write your changing variable(s) (Ex: block height) and the values (Ex: 5 cm) you will use for your trials under each block.



### Changing Variable(s):

1) \_\_\_\_\_ : \_\_\_\_\_

2) \_\_\_\_\_ : \_\_\_\_\_

3) \_\_\_\_\_ : \_\_\_\_\_

### Controls (variables you will hold constant):

Write your controls and the values you will use in all your trials (control/value, Ex: light color/white).

Light Color	/	White	/
_____	/	_____	/
_____	/	_____	/

SciTrek Member Approval: \_\_\_\_\_



## PROCEDURE

### Procedure Note:

Make sure to include all values of your changing variable(s) in the procedure. Ex: For a subgroup that decided to change block height one step would be: Place block that is 7 cm wide, 3 cm long, and A) 2 cm, B) 5 cm, C) 8 cm, and D) 10 cm high on the white plastic.

1. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

3. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

4. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

5. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

6. \_\_\_\_\_

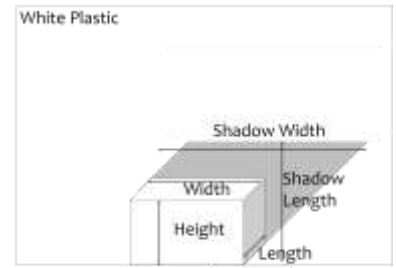
\_\_\_\_\_

\_\_\_\_\_

SciTrek Member Approval: \_\_\_\_\_

# RESULTS

**Table**



Fill out the table for each of your trials. For the variables that remain constant, write the value in *Trial A*. Then, draw an arrow through each box indicating the variable is a control.

Underline controls, circle changing variables, and box information about data collection.

Variables		Trial A	Trial B	Trial C	Trial D
Light Color:		<b>White</b>	→		
Block Height:					
Block Width:					
Block Length:					
Light Distance:					
Light Height:					
Light Angle:					
_____ Other Variable					
_____ Other Variable					
Predictions		Trial A	Trial B	Trial C	Trial D
Put an "S" in the trial that will give the smallest shadow length/width and a "B" in the trial that will give the biggest shadow length/width.					
Data		Trial A	Trial B	Trial C	Trial D
Measurements:	Shadow Length				
	Or Width (Circle one)				

The independent variable(s) is(are) the changing variable(s) and the dependent variable is the measurement.

# RESULTS

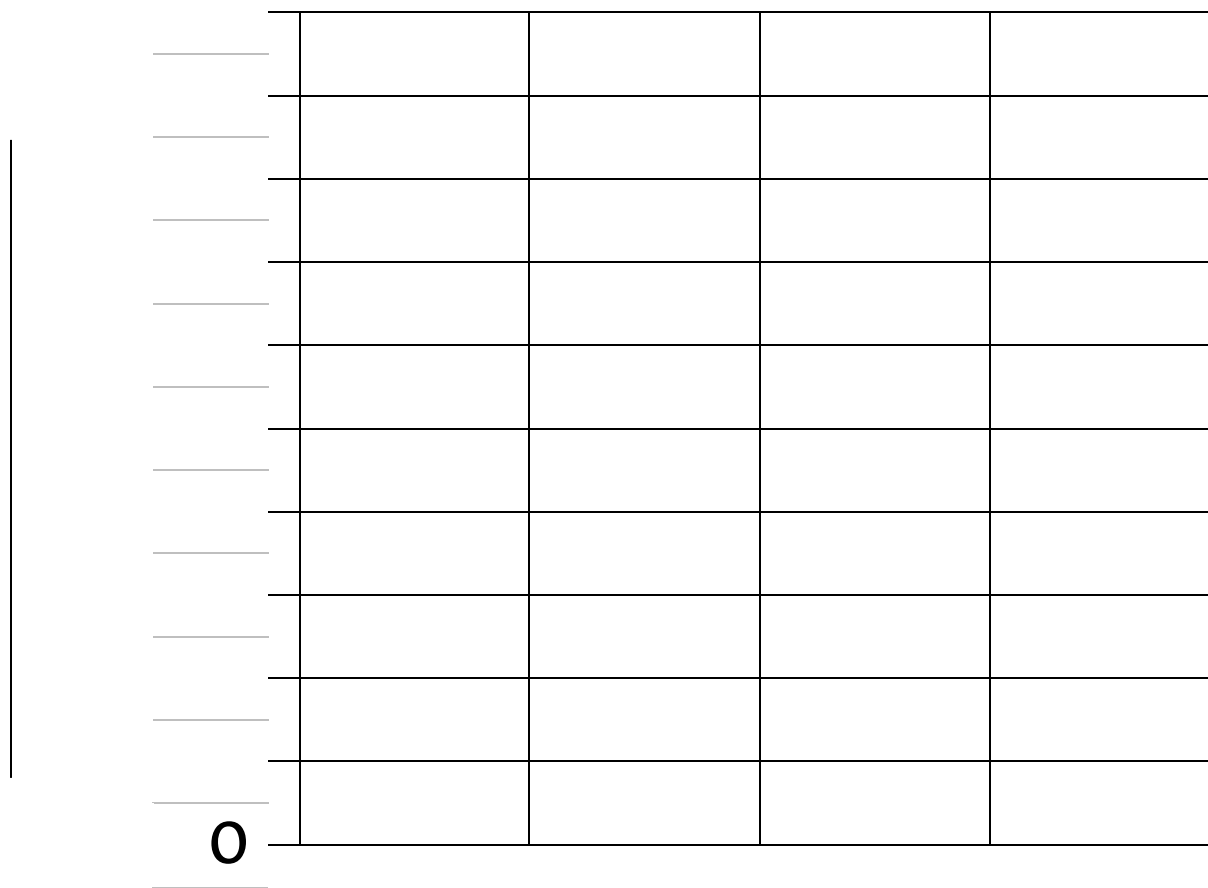
## Graph

**Set up your graph.** (Check off the steps as you complete them.)

- Label the y-axis (vertical) with what you measured, including units (Ex: Shadow Length (cm)).
- Determine an appropriate scale which will allow you to graph all of your data points and write the numbers on the given lines.
- Label the x-axis (horizontal) with your changing variable(s) #1, #2, and #3 (Ex: Block Height).  
Changing variable #2 and #3 will only be filled in if you have 2 or 3 changing variables.
- On your results table, label your measurements from 1 to 4, with 1 being the trial with the smallest measurement, and 4 being the trial with the largest measurement.

**Plot your data in increasing order.**

- Write the changing variable value(s) (Ex: 3 cm) for the trial that you labeled 1 under the first column.
- Graph your data for that trial and write the measurement above the bar.
- Repeat the process for the other trials.



	:				
Changing Variable #1					
	:				
Changing Variable #2					
	:				
Changing Variable #3					

## SCIENTIFIC PRACTICES

### Conclusions

1. **Directions:** Fill in the missing definition.

- **Conclusion:** \_\_\_\_\_
  - **Claim:** A statement that can be tested. The explanation of the data, the first part of a conclusion.
    - Ex: Donuts have more fat than toast
  - **Data:** Evidence collected from experiment(s) (measurements or observations), the second part of a conclusion.
    - Ex: 1 serving of donuts has 11 grams of fat while 1 serving of toast has 5 grams of fat.

2. **Directions:** Circle if the statement is a CLAIM, DATA, or an OPINION.

- |  |              |             |                |
|--|--------------|-------------|----------------|
| a. out of 10 people, only 3 can ride a unicycle                                    | <i>Claim</i> | <i>Data</i> | <i>Opinion</i> |
| b. puppies are cute  | <i>Claim</i> | <i>Data</i> | <i>Opinion</i> |
| c. people who get 4 hours of sleep experience dizziness                            | <i>Claim</i> | <i>Data</i> | <i>Opinion</i> |
| d. ants were observed on syrup, starbursts, and frosted flakes                     | <i>Claim</i> | <i>Data</i> | <i>Opinion</i> |
| e. the fastest land animal in the world is the cheetah                             | <i>Claim</i> | <i>Data</i> | <i>Opinion</i> |
| f. when 2 mL of vinegar was mixed with 2 g of baking soda, 1 L of gas was produced | <i>Claim</i> | <i>Data</i> | <i>Opinion</i> |
| g. the more simple the flower, the more bees on the flower                         | <i>Claim</i> | <i>Data</i> | <i>Opinion</i> |

## SCIENTIFIC PRACTICES

### Conclusions

3. **Directions:** Draw a line connecting claims with the correct data. If there is no data that supports the claim, do not draw a line.

Claim	Because	Data
1. More people go to soccer matches than basketball games		a. 1 ml of diet coke weighs 5 g and 1 ml of coke weighs 1.1 g.
2. Spicy food causes heartburn		b. 50% of people get heartburn when they use hot sauce and 10% of people get heartburn when they don't use hot sauce.
3. Cars increase air pollution		c. The air has been observed to be brown in areas with large numbers of cars.
4. Diet coke weighs less than regular coke		d. 10 people went to the movies, while 15 went shopping.

## SCIENTIFIC PRACTICES

### Conclusions

Variables		Trial A	Trial B
Light Color:		White	→
Block Height:		9 cm	→
Block Width:		7 cm	→
Light Distance:		50 cm	→
Light Height:		30 cm	→
Light Angle:		30°	60°
Data		Trial A	Trial B
Measurements:	Shadow Length:	6 cm	10 cm

4. **Directions:** Step 1: Identify the following statements as either CLAIM or DATA and write a C or D on the line. Step 2: Look at the results table and circle if the statement is a correct claim, correct data, or incorrect. Statements are INCORRECT if the statement does not agree with the data table or has not been tested.

	<u>Step 1:</u> Statement Type: C or D	<u>Step 2:</u> Based on the table, is the statement a correct claim, correct data, or Incorrect?			
a. the light height affects the length of the shadow	_____	Correct Claim	Correct Data	Incorrect	
b. a larger light angle will result in a longer shadow	_____	Correct Claim	Correct Data	Incorrect	
c. when a block is 9 cm tall, different light angles give different shadow lengths	_____	Correct Claim	Correct Data	Incorrect	
d. when the light angle was 60°, the shadow length was 6 cm	_____	Correct Claim	Correct Data	Incorrect	

What data can be used to support claim b above? \_\_\_\_\_

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## SCIENTIFIC PRACTICES

### Conclusions

Variables		Trial A	Trial B
Light Color:		White	—————→
Block Height:		6 cm	10 cm
Block Width:		7 cm	—————→
Light Distance:		30 cm	50 cm
Light Height:		25 cm	—————→
Light Angle:		90°	—————→
Data		Trial A	Trial B
Measurements:	Shadow Length:	5 cm	13 cm

5. **Step 1:**  
Statement  
Type: C or D **Step 2:**  
Based on the table, is the statement a  
correct claim, correct data, or Incorrect?
- |   |       |                  |                 |           |
|---|-------|------------------|-----------------|-----------|
| a. the brighter the light, the longer the shadow  | _____ | Correct<br>Claim | Correct<br>Data | Incorrect |
| b. when the block height was 6 cm, the shadow length was 5 cm, and when the block height was 10 cm, the shadow length was 13 cm | _____ | Correct<br>Claim | Correct<br>Data | Incorrect |
| c. when the block height is smaller, the shadow length is longer  | _____ | Correct<br>Claim | Correct<br>Data | Incorrect |
| d. the longer the light distance, the longer the shadow length  | _____ | Correct<br>Claim | Correct<br>Data | Incorrect |

If no claim can be made from the data state why not. \_\_\_\_\_

If no claim can be made from the results, can you make a conclusion?

YES

NO

## SCIENTIFIC PRACTICES

### Conclusions

6. **Directions:** Decide if a claim/conclusion can be made for each of the following results tables and graph.

Table A

Variables	Trial A	Trial B
Light Color:	White	→
Block Height:	8 cm	4 cm
Block Width:	3 cm	→
Light Distance:	25 cm	30 cm
Light Height:	35 cm	→
Light Angle:	45°	60°
Data	Trial A	Trial B
Shadow Length:	8 cm	6 cm

Can this scientist make a claim/conclusion? \_\_\_\_\_

Table B

Variables	Trial A	Trial B
Light Color:	White	→
Block Height:	10 cm	→
Block Width:	7 cm	→
Light Distance:	40 cm	→
Light Height:	10 cm	40 cm
Light Angle:	90°	→
Data	Trial A	Trial B
Shadow Length:	8 cm	6 cm

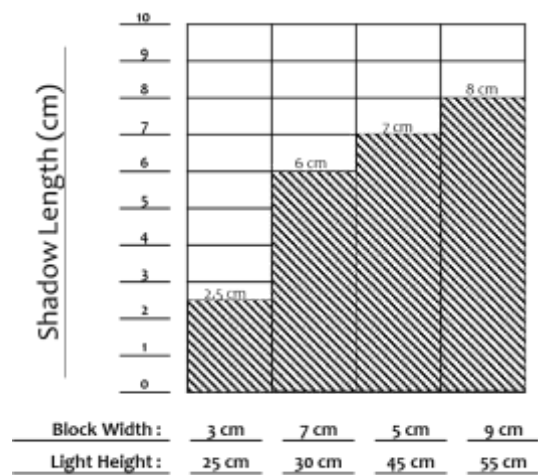
Can this scientist make a claim/conclusion? \_\_\_\_\_

Table C

Variables	Trial A	Trial B
Light Color:	White	→
Block Height:	5 cm	9 cm
Block Width:	7 cm	→
Light Distance:	45 cm	→
Light Height:	30 cm	→
Light Angle:	30°	→
Data	Trial A	Trial B
Shadow Length:	2 cm	5 cm

Can this scientist make a claim/conclusion? \_\_\_\_\_

Graph D



Can this scientist make a claim/conclusion? \_\_\_\_\_



# CONCLUSION

## *Making a Conclusion from Your Data*

How many changing variables did you have in your experiment? \_\_\_\_\_

Can you make a conclusion from your data?       YES                       NO

**IF NO**

Why? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**IF YES**

### CONCLUSION

We can conclude \_\_\_\_\_  
claim

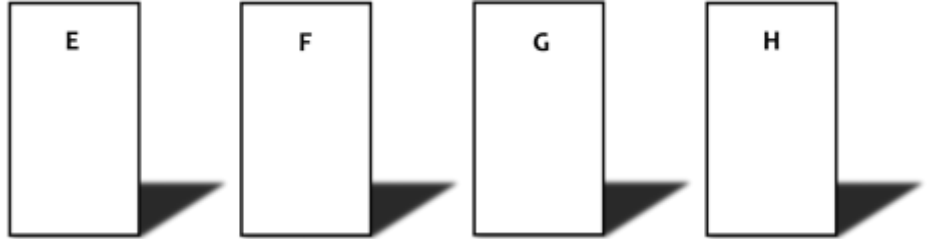
because \_\_\_\_\_  
data (measurements/observations)

SciTrek Member Approval: \_\_\_\_\_



## EXPERIMENTAL SET-UP

Write your changing variable(s) (Ex: block height) and the values (Ex: 5 cm) you will use for your trials under each block.



### Changing Variable(s):

- 1) \_\_\_\_\_ : \_\_\_\_\_
- 2) \_\_\_\_\_ : \_\_\_\_\_
- 3) \_\_\_\_\_ : \_\_\_\_\_

### Controls (variables you will hold constant):

Write your controls and the values you will use in all your trials (control/value, Ex: light color/white).

Light Color	/	White	/
_____	/	_____	/
_____	/	_____	/

SciTrek Member Approval: \_\_\_\_\_

## PROCEDURE

### Procedure Note:

Make sure to include all values of your changing variable(s) in the procedure. Ex: For a subgroup that decided to change block height one step would be: Place block that is 7 cm wide, 3 cm long, and E) 2 cm, F) 5 cm, G) 8 cm, and H) 10 cm high on the white plastic.

1. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

3. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

4. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

5. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

6. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

SciTrek Member Approval: \_\_\_\_\_

## SCIENTIFIC PRACTICES

### Conclusions

Question: If we change the \_\_\_\_\_, what will  
happen to \_\_\_\_\_?

Variables		Trial A	Trial B	Trail C	Trial D
Light Color:		White	→	→	→
Block Height:		7 cm	→	→	→
Block Width:		3 cm	→	→	→
Block Length:		5 cm	→	→	→
Light Distance:		20 cm	→	→	→
Light Height:		25 cm	→	→	→
Light Angle:		90°	→	→	→
Block Material:		Wood	Foam	Metal	Cardboard
Data		Trial A	Trial B	Trial C	Trial D
Measurements:	Shadow Length:	12 cm	12 cm	12 cm	12 cm

Write a conclusion from the results above:

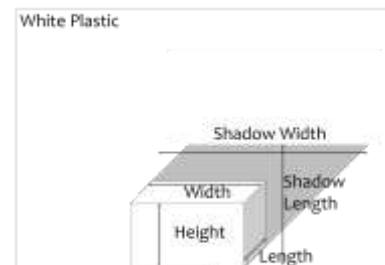
We can conclude \_\_\_\_\_  
claim

because \_\_\_\_\_  
data

# RESULTS

## Table

Fill out the table for each of your trials. For the variables that remain constant, write the value in *Trial E*. Then, draw an arrow through each box indicating the variable is a control.



Underline controls, circle changing variables, and box information about data collection.

Variables		Trial E	Trial F	Trial G	Trial H
Light Color:		<b>White</b>	→		
Block Height:					
Block Width:					
Block Length:					
Light Distance:					
Light Height:					
Light Angle:					
_____					
Other Variable					
Predictions		Trial E	Trial F	Trial G	Trial H
Put an "S" in the trial that will give the smallest shadow length/width and a "B" in the trial that will give the biggest shadow length/width.					
Data		Trial E	Trial F	Trial G	Trial H
Measurements:	Shadow Length Or Width (Circle one)				

The independent variable is the changing variable and the dependent variable is the measurement.

# RESULTS

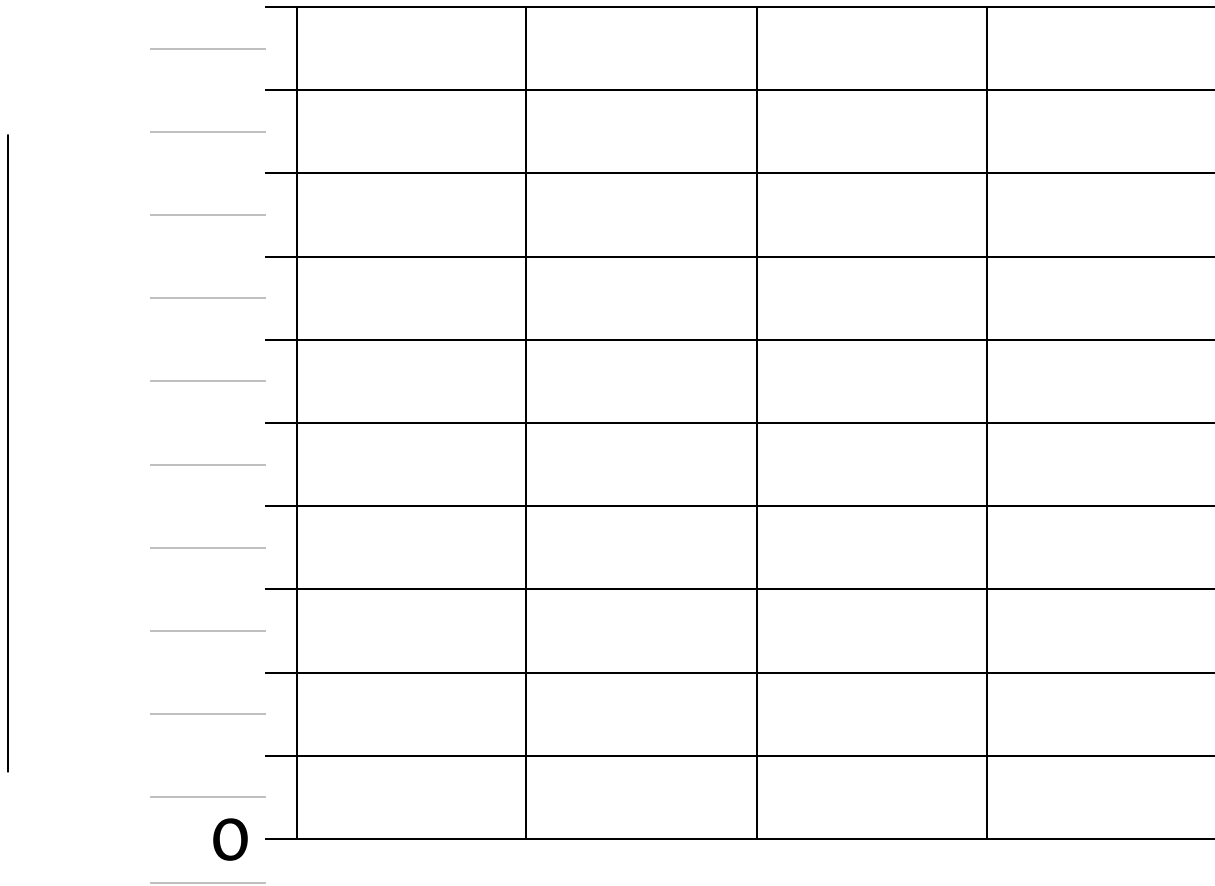
## Graph

**Set up your graph.** (Check off the steps as you complete them.)

- Label the y-axis (vertical) with what you measured, including units (Ex: Shadow Length (cm)).
- Determine an appropriate scale which will allow you to graph all of your data points and write the numbers on the given lines.
- Label the x-axis (horizontal) with your changing variable(s) #1, #2, and #3 (Ex: Block Height).  
Changing variable #2 and #3 will only be filled in if you have 2 or 3 changing variables.
- On your results table, label your measurements from 1 to 4, with 1 being the trial with the smallest measurement, and 4 being the trial with the largest measurement.

**Plot your data in increasing order.**

- Write the changing variable value(s) (Ex: 3 cm) for the trial that you labeled 1 under the first column.
- Graph your data for that trial and write the measurement above the bar.
- Repeat the process for the other trials.



	:				
Changing Variable #1					
	:				
Changing Variable #2					
	:				
Changing Variable #3					

# CONCLUSION

**Generate a claim about how your changing variable affected your results.** (Ex: The block material does not affect the shadow length.)

We can conclude \_\_\_\_\_  
claim

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**What data do you have to support your claim?** (Remember to include your measurements, not trial letters.)

because \_\_\_\_\_  
data

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Can you test the first part (claim) of the conclusion?

YES

NO (If you checked this box, go back and revise your claim so that it can be tested.)

The second part of the conclusion is data because it contains a \_\_\_\_\_.

I acted like a scientist when \_\_\_\_\_

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## NOTES ON PRESENTATIONS

*What variables affect shadows?*

Changing Variable:				
Shadow    Length    Width (cm): <span style="margin-left: 100px;"><small>Circle One</small></span>				

Summary: \_\_\_\_\_

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Changing Variable:				
Shadow    Length    Width (cm): <span style="margin-left: 100px;"><small>Circle One</small></span>				

Summary: \_\_\_\_\_

---

Changing Variable:				
Shadow    Length    Width (cm): <span style="margin-left: 100px;"><small>Circle One</small></span>				

Summary: \_\_\_\_\_

---

Changing Variable:				
Shadow    Length    Width (cm): <span style="margin-left: 100px;"><small>Circle One</small></span>				

Summary: \_\_\_\_\_

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What variables affect shadows?

Changing Variable:				
Shadow    Length    Width (cm): <small>Circle One</small>				

Summary: \_\_\_\_\_  
\_\_\_\_\_

Changing Variable:				
Shadow    Length    Width (cm): <small>Circle One</small>				

Summary: \_\_\_\_\_  
\_\_\_\_\_

Changing Variable:				
Shadow    Length    Width (cm): <small>Circle One</small>				

Summary: \_\_\_\_\_  
\_\_\_\_\_

Changing Variable:				
Shadow    Length    Width (cm): <small>Circle One</small>				

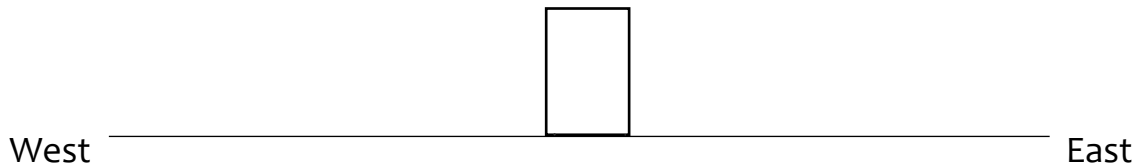
Summary: \_\_\_\_\_  
\_\_\_\_\_

## TIE TO STANDARDS

- Using the given information for each experiment draw a **circle** around your **prediction** of what will happen to the shadow length and width. Once you have seen the pictures of the experiment draw a box around what actually happened to the shadow length and width. For all the experiments a 5 cm × 7 cm × 3 cm block was used.

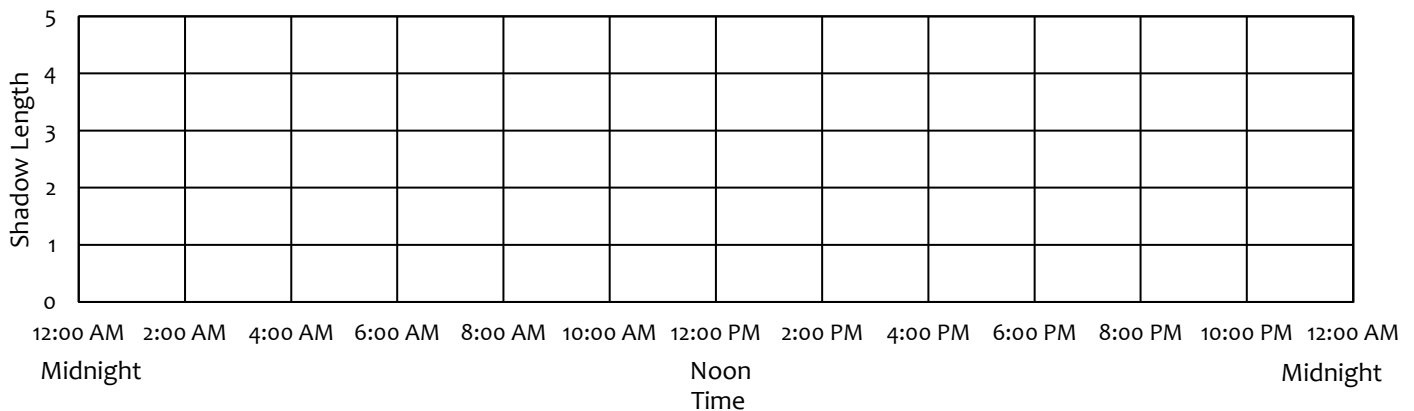
Experiment 1: Effects of Changing Light Color	
	<p>What will happen to:</p> <p><i>Shadow Length</i></p> <p>Shorter    Same    Longer</p> <p><i>Shadow Width</i></p> <p>Thinner    Same    Wider</p>
<p><b>Light Color: Blue</b> Light Height: 20 cm Light Distance: 10 cm Light Angle: 90°</p>	<p><b>Light Color: Orange</b> Light Height: 20 cm Light Distance: 10 cm Light Angle: 90°</p>
Experiment 2: Effects of Changing Light Height	
	<p>What will happen to:</p> <p><i>Shadow Length</i></p> <p>Shorter    Same    Longer</p> <p><i>Shadow Width</i></p> <p>Thinner    Same    Wider</p>
<p>Light Color: White <b>Light Height: 20 cm</b> Light Distance: 10 cm Light Angle: 90°</p>	<p>Light Color: White <b>Light Height: 60 cm</b> Light Distance: 10 cm Light Angle: 90°</p>
Experiment 3: Effects of Changing Light Distance	
	<p>What will happen to:</p> <p><i>Shadow Length</i></p> <p>Shorter    Same    Longer</p> <p><i>Shadow Width</i></p> <p>Thinner    Same    Wider</p>
<p>Light Color: White Light Height: 20 cm <b>Light Distance: 10 cm</b> Light Angle: 90°</p>	<p>Light Color: White Light Height: 20 cm <b>Light Distance: 60 cm</b> Light Angle: 90°</p>
Experiment 4: Effects of Changing Light Angle	
	<p>What will happen to:</p> <p><i>Shadow Length</i></p> <p>Shorter    Same    Longer</p> <p><i>Shadow Width</i></p> <p>Thinner    Same    Wider</p>
<p>Light Color: White Light Height: 20 cm Light Distance: 10 cm <b>Light Angle: 90°</b></p>	<p>Light Color: White Light Height: 20 cm Light Distance: 10 cm <b>Light Angle: 150°</b></p>

2. What is the most important light source in your life? \_\_\_\_\_
3. The sun rises in the \_\_\_\_\_ and sets in the \_\_\_\_\_.
4. What causes the changes in the sun's position throughout the day? \_\_\_\_\_  
\_\_\_\_\_
5. Draw the sun's position and the corresponding shadow for each of the following times:  
 A: Sunrise    B: Midmorning    C: Noon    D: Afternoon    E: Sunset



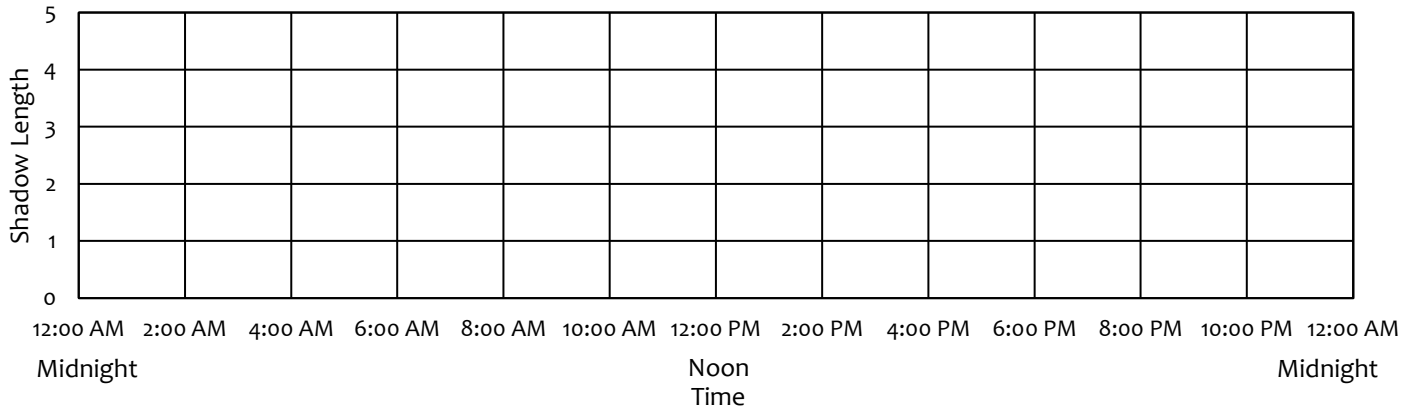
6. What time(s) of day are shadows the longest? \_\_\_\_\_
7. What time(s) of day are shadows the shortest? \_\_\_\_\_
8. Using what you have learned about shadows, make a line graph showing how shadow length changes over the course of 24 hours in the winter. Use a **red** line to show your **predicted** values and a pencil line to show the actual data.

How Shadow Length Varies in the Winter



9. Using what you have learned about shadows, make a line graph showing how shadow length changes over the course of 24 hours in the summer. Use a **red** line to show your **predicted** values and a pencil line to show the actual data.

How Shadow Length Varies in the Summer



10. What conclusion can you make from the graphs about the amount of daylight throughout the year?

We can conclude that the number of daylight hours in the summer is \_\_\_\_\_

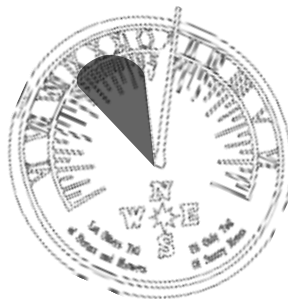
than in the winter because \_\_\_\_\_

\_\_\_\_\_

11. Using the sundials below, determine what time of day it is (morning / noon / afternoon).



What time of day is it?  
\_\_\_\_\_



What time of day is it?  
\_\_\_\_\_



What time of day is it?  
\_\_\_\_\_

## EXTRA PRACTICE

### Conclusions

**Directions:**

On the results table, underline each control, circle each changing variable(s), and box information about data collection.

Variables		Trial A	Trial B
Light Color:		White	→
Block Height:		5 cm	10 cm
Block Width:		7 cm	→
Light Distance:		25 cm	→
Light Height:		25 cm	→
Light Angle:		90°	→
Data		Trial A	Trial B
Measurements:	Shadow Length:	7 cm	15 cm

Can this group make a claim/conclusion?      Yes      No      I Don't Know

**Step 1:** Statement Type: C or D      **Step 2:** Based on the table, is the statement a correct claim, correct data, or Incorrect?

- |  |       |               |              |           |
|--|-------|---------------|--------------|-----------|
| 1. the 5 cm block had a 7 cm shadow length and the 10 cm block had a 15 cm shadow length | _____ | Correct Claim | Correct Data | Incorrect |
| 2. the block height does not affect the shadow length                                    | _____ | Correct Claim | Correct Data | Incorrect |
| 3. when the light height is 25 cm, a taller block results in a longer shadow             | _____ | Correct Claim | Correct Data | Incorrect |
| 4. the light distance affects the shadow length  | _____ | Correct Claim | Correct Data | Incorrect |
| 5. the block height affects the shadow length  | _____ | Correct Claim | Correct Data | Incorrect |

What data can be used to support the correct claim(s) above? \_\_\_\_\_

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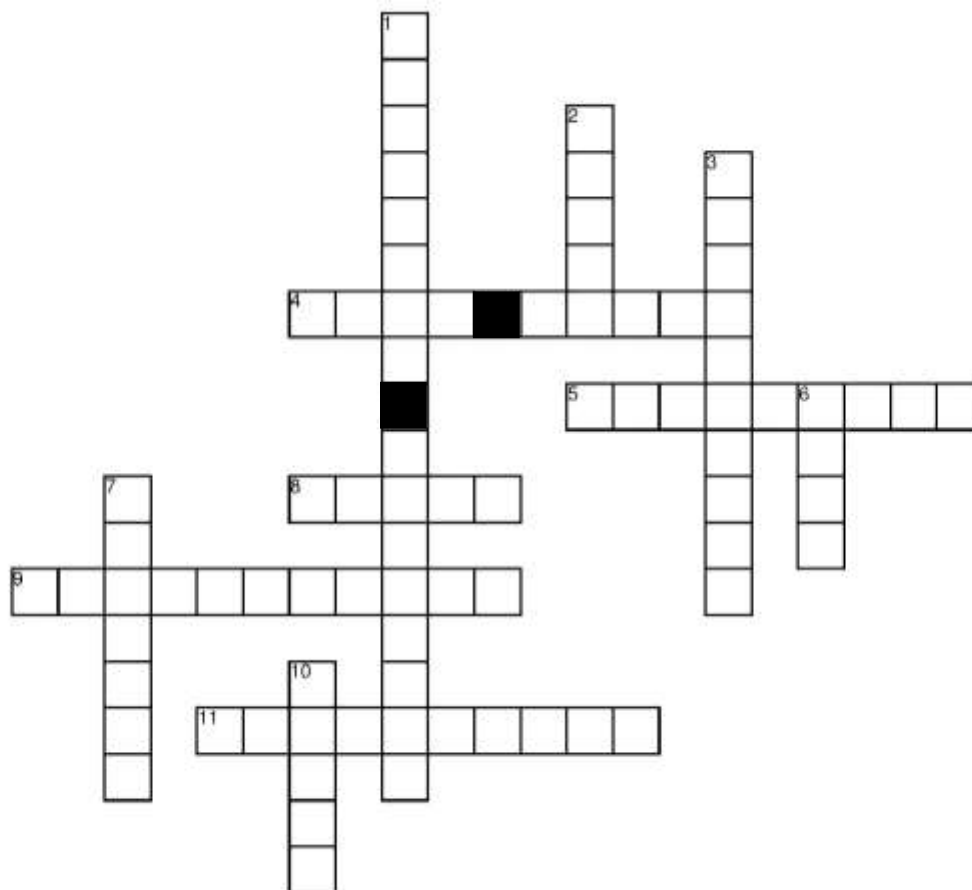
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## CROSSWORD PUZZLE

**Directions:** Fill out the following crossword puzzle using the clues below. The list of words used for the crossword can be found on the vocabulary page of your notebook (page 1).



### Across

- 4) The clamp was adjusted up and down on a \_\_\_\_\_ to make the light height larger or smaller.
- 5) Before you carry out your experiment, you must write this to describe the steps you will take.
- 8) A statement explaining (what/how/why) the outcome of your results.
- 9) The shape and color of the shadow are examples of \_\_\_\_\_ made during this experiment.
- 11) An explanation of the experiment followed by observations or measurements from your results.

### Down

- 1) In order to draw a conclusion from any experiment I run, I must have one \_\_\_\_\_.
- 2) A form of energy that makes it possible to see things.
- 3) We use data from previous experiments to come up with a \_\_\_\_\_ about what will happen in future experiments.
- 6) This is used to support your claim.
- 7) We put information into a \_\_\_\_\_ table in order to easily see which variable is changing and the values of those held constant.
- 10) A measurement telling the separation between two lines that meet at one point.



SciTrek is an educational outreach program that is dedicated to allowing 2<sup>nd</sup> - 12<sup>th</sup> grade students to experience scientific practices firsthand. SciTrek partners with local teachers to present student-centered inquiry-based modules that not only emphasize the process of science but also specific grade level NGSS performance expectations. Each module allows students to design, carry out, and present their experiments and findings.

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