

SEARCHING THE SKY



TEACHER GUIDE



PLANNING

Here's a suggested schedule for this kit! The activities should be completed in order, but you can choose when the lessons take place over time.

ACTIVITY INFORMATION	SECTION (S)	TIME REQUIRED	DAY/ LESSON
ACTIVITY 1: CALENDAR IN THE SKY Use calendars of ancient people to begin your understanding of what can be learned from the universe. Time required: 1 h 30 min	<input type="checkbox"/> Ancient Calendars	60 minutes	Day 1
	<input type="checkbox"/> Creating Calendars	30 minutes	Day 2
ACTIVITY 2: SOLAR SYSTEM OBJECTS Work through several types of scale to best understand the scale of the universe. Time required: 3 h 30 min	<input type="checkbox"/> In the Sky	75 minutes	Day 3
	<input type="checkbox"/> Spatial Scale	45 minutes	Day 4
	<input type="checkbox"/> Time Scale	45 minutes	Day 5
	<input type="checkbox"/> Scale Properties	45 minutes	Day 6
ACTIVITY 3: WHY CAN'T I FLY? Work with gravity in a hands-on way that doesn't require you to drop something. Time required: 3 h 30 min	<input type="checkbox"/> Gravity	90 minutes	Day 7
	<input type="checkbox"/> Boxed In	60 minutes	Day 8
	<input type="checkbox"/> Newton's Law of Gravity		
ACTIVITY 4: INTO THE UNKNOWN Discover how gravity is...			

SAMPLE

Full schedule available with purchase

? (REFLECT) **Question:** Use the information on the spatial scale of the Solar System to create a model or reference guide.

Answer: Answers will vary.

How to Help:

- Students may create their model or guide any way they would like.
- There is an extension in Activity 6 called *Solar System Model* that would pair well here.

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TIME SCALE

PREPARATION AND SUPERVISION

- Students will be taking footage of themselves either bouncing a ball against the ground and a wall, or throwing a ball between themselves and a partner.
 - The resulting knowledge is the same regardless of which they choose.
 - You can be your student's partner.
 - Your student can choose a different action so long as it will create a circular motion of the ball.
- Your student will use the footage they take to create a time scale.
 - Their time scale should include the time each event happened.
 - Their time scale should include appropriate distances between event that are equivalent ratios to that of the actual footage of the events.
- The vocabulary term time scale is defined for your student.



THINK ABOUT IT!

? **Question:** Use your camera footage to create a time scale of the events that occurred.

Answer: Answers will vary.

How to Help: You may need to show your student how to start, stop, speed up, and slow down their footage to assist in creating their timescale.

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SCALE PROPERTIES

CONTENT

- Students will learn about the scale properties diameter, mass, and structure.
- Each of the scale properties, including time scale and spatial scale, are important elements of the Solar System for your student to understand.
- The vocabulary term scale property is defined.
- Students likely already know what diameter and mass are, but they are briefly defined for your student in the text. However, they are not required vocabulary terms.

WHY CAN'T I FLY?

The masses of different solar objects impact how they move around the solar system.

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activity

LEARNING GOALS:

- ✓ I can make a model to show how gravity affects motion within galaxies and the Solar System.

MULTIPLE AGES AND ABILITIES:

This experiment is another great opportunity to involve multiple students in different roles. Some students may need some support coordinating the circular motion, counting the number of cycles, and starting the stopwatch.



THINK ABOUT IT!

Question 1: Which combination of washers had the greatest number of cycles in 30 seconds?

Answer: One washer spinning and two washers hanging down.

How to Help:

- Have the student repeat their experiment trials if they did not have the same results.
- Based on experiment trials, this should be around 50 cycles in 30 seconds.

Question 2: Which combination of washers had the least number of cycles in 30 seconds?

Answer: Two washers spinning and one washer hanging down.

How to Help:

- Have the student repeat their experiment trials if they did not have the same results.
- Based on experiment trials, this should be around 30 cycles in 30 seconds.

Question 3: How did the stopper combinations compare to the washer only combinations?

Answer:

- The stopper on the bottom led to a greater number of cycles.
- The stopper on the top led to a fewer number of cycles.

How to Help:

- Have students repeat their experimental trials if they did not get the same results.
- The number of cycles will vary, but should be greater than 50 and less than 30.

Question 4: How might this experiment relate to black holes?

Answer: Answers will vary.

How to Help: This question is speculative for the student and is leading them to think about the greater implications of their experiment.

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BLACK HOLES

CONTENT

- This section talks about black holes and how they relate to gravity.
- Students will learn the vocabulary terms black hole and supernova.



THINK ABOUT IT!

Question 1: Explain the relationship between black holes and gravity.

Answer:

- Black holes have an extremely strong gravitational pull that can even pull light into it.
- The gravitational pull of a black hole can pull entire Solar System into it.

How to Help: Have students return to their experiment in the previous section and the content of this question.



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