



Science Assessment System Through Course Task

Picnic Time

Grade Level:

1

Phenomena:

Shadows

Science & Engineering Practices:

Analyzing and Interpreting Data
Engaging in Argument from Evidence

Crosscutting Concepts:

Patterns

Designed and revised by Kentucky Department of Education staff
in collaboration with teachers from Kentucky schools and districts.



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Preparing to implement Through Course Tasks in the Classroom

What is a TCT?

- TCTs are 3-dimensional tasks specifically designed to get evidence of student competency in two dimensions, Science and Engineering Processes (SEPs) and Crosscutting Concepts (CCC), untethered from Performance Expectations (PEs)/standards. Tasks are sense-making experiences.
- Tasks are to be used formatively. The goal is for both students and teachers to understand areas of strength and improvement for the SEP(s) and CCC assessed within the task.

How do I facilitate a Through Course Task (TCT)?

- TCT facilitation is a collaborative process in which teacher teams calibrate understanding of the expectations of the task and refine strategies to be used during task facilitation.

Before the task:

1. Complete the TCT as a learner – compare understanding of task through the lens of success criteria (identified in the task) in order to understand expectations.
Success criteria include:
 - What is this task designed to get evidence of?
 - What is the task asking the students to do?
 - What might a student response look like?
2. Identify the phenomenon within the task. Consult resources to assure teacher teams have a deep understanding of associated science concepts.
3. Collaborate to generate, review and refine feedback questions during facilitation.
4. Identify potential “trouble spots” and plan for possible misconceptions.

During the task:

5. Collect defensible evidence of each student’s competencies in 3-dimensional sense-making for the task.
6. Ask appropriate feedback questions to support student access and engagement with the task in order to elicit accurate evidence of student capacities.

After the task:

7. Reflect on the task as a collaborative team.
8. Review student work samples to identify areas of strength and areas of need.
9. Determine/plan next steps to move 3-D sense making forward through the strengthening of the use of SEPs and CCCs.

Using the materials included in this packet:

- **Task Annotation:**
 - The task annotation is a teacher guide for using the task in the classroom. Additionally, the annotation gives insight into the thinking of developers and the task overall.

- Each task has science and engineering practices, disciplinary core ideas, and crosscutting concepts designated with both color and text style:
 - **Science and Engineering Practices**
 - *Disciplinary Core Ideas*
 - Crosscutting Concepts
- **Student Task:** The materials to be used by students to complete the TCT.

Picnic Time Task Annotation

After analyzing and interpreting data about the *relationships between the position of the sun and resulting shadows*, **make an argument** *for the placement of an object to be in a shadow* based on patterns identified in the data.

Overall intent

This primary task was developed with the intention of evaluating students' ability to analyze and interpret data about the relationship of the sun and the different shadows that result from objects blocking direct sunlight. Students will then make an argument for the placement of an object so that it will be in a shadow/shade based on the pattern identified in the data and make a justification.

Phenomenon within the task

This task will provide evidence of the student's understanding of the relationship between the Earth, sun, and relative shadows. As the Earth moves, the sun appears to rise in the east and set in the west. This predictable occurrence provides an observable phenomena of a pattern of shadows as they relate to the sun's position.

Ideas for setting up the task with students

- Share ideas for setting up a positive learning climate in order to get the best evidence of what the task is designed to measure.
- In weeks prior to administering the assessment, begin to make observations about the position of the sun when arriving at school, at lunch, at recess and at dismissal; determine the sun's position during sunrise, morning (am), noon (pm) and afternoon. Promote an awareness of the pattern that occurs in the sky each day and activities that occur during the time frames observed. Note, when developing this, it was decided to label the pictures as if the reader is facing south. This promotes student thinking about the information provided. Often diagrams show east on the right which assumes the observer would be facing north. This presents an opportunity for you to engage students in experiences where they can observe shadows looking both north and south. This is dependent on your students' ability levels.
- Begin to collect at least three data points (note time of day) for the length of the sun's shadow on consecutive days. A suggestion would be to place an object on paper and trace the shadows at various times, recording the times with students. Consider using a specific color when recording each observation and corresponding student discourse in order to help them

recall and refer to specific data. Also, make observations on cloudy days and/or first thing in the morning when the shadow is less pronounced. Consider using a small reading pointer that can be stabilized in playdough as the object use to cast a shadow. It is easily transported and students are able to manipulate this tool. During one of the recordings, strategically place a student between the sun and pointer so that the shadow of the pointer cannot be observed. When recording the shadow, the students should not be able to locate the shadow of the pointer but they should be able to identify the shadow of the student. With guidance, this can lead them to understand the correlation between the size of the object casting the shadow and the shadow itself.

- After students are familiar with the process, consider making small-group observations and data collection points. Some students could take pictures of their partners' shadow or various objects, e.g., flagpole, bench, trash can.
- Provide an inquiry activity that promotes students discovering the relationship between the size of the shadow and the distance between the object and the light source. Students will come to understand that shadows can look much larger than the actual object. For instance, a large, scary-looking shadow is actually a small stuffed animal. Students need to understand this concept.
- Students should understand that a shadow is created when an object blocks light from any light source (both inside and outside).
- Students need to understand that shade is actually a shadow.
- **Consider stamina of students. Task can be completed over multiple days.**

Intent of the Task for Assessment

The overall intent of *Picnic Lunch* is to assess students' ability to examine information in the illustrations and recognize the pattern of shadows occurring at different times of day based on the earth and sun's relationship.

Students are asked to recall information about shadows they learned through engagement in classroom experiences and to study the provided illustrations. Students are asked to identify a pattern in the shadows (morning, noon, and afternoon).

Students will interpret data (illustrations) to identify a consistent pattern in the daily apparent motion of the sun and resulting shadows. Students will transfer this understanding to a situation. The situation requires them to identify where a shadow will occur at a given time of day. They are to use the shadow pattern they observed in the provided illustrations as evidence to support their decision.

General Prompts:

- Tell me more.

- Look at the chart. What does the arrow (above the chart) tell you?
- What can you tell me about the shadows and the position of the sun?
- Tell me about the sun and its shadow in this picture in the morning.
- How does the shadow change by lunch and in the afternoon?
- Use your pencil to show how the sun appears to travel over the day as the earth moves.
- Why do you choose this blanket to be in the sun at lunchtime? How do you know?
- What information helped you make your decision?

Specific prompts per question:

- **Question 1:** Look at the chart, what do you notice about the shadows? Think about your observations of the sun and what does it tell you about the shadow in the morning through the afternoon?
- **Question 2:** How does that information help in thinking about the position of the sun during the day? Look at the shadows on the chart...think about where the sun will be in the morning through the afternoon.
- **Question 3:** Think...if the sun is in the east (or left side of the paper), where will the shadow be? Why?
- **Question 4:** After selecting a sun, touch each blanket and think if it will be in the shade. How will you know if it will be in the shade? Use your finger to connect the sun to the blanket. Is the tree in between the sun and the blanket? Will the sun's light be blocked by the tree?

Success Criteria

Evidence of Learning Desired based on Progression from Appendices

- Use and share picture, drawings and/or writings of observations. (Appendix F)
- Use observations to describe patterns and/or relationships in the natural or designed world in order to solve scientific questions and solve problems. (Appendix F)
- Construct an argument with evidence to support a claim.
- Patterns in the natural and human designed world can be observed, used to describe phenomenon, and used as evidence. (Appendix G)

Success Criteria

- Students are able to indicate the location of the sun around lunchtime based on classroom observations (not scored but required information for providing an appropriate response.)
- Students synthesize information gathered through observations about the change in shadows as a result of the apparent motion of the sun. Students will provide a reasoned explanation for selecting a specific blanket (making a claim) that will be in the shade at lunchtime.
 - Students may write, draw, or do both to answer their open-ended questions.

Possible Student Responses

Student response is dependent on the placement of the sun in the picture. Since lunchtime is not a constant for all classes in all schools, the response below is based on observing as close to noon as possible. On average, the 4th -6th positions of the sun are the best choices.

Indicators of mastery include:

- Identification of the location of sun at lunchtime (varies with classroom schedules).
- Knows that the shadow will be small and close to the object (tree).
- Know that the sun's light is blocked by the tree which creates the shade/shadow.
- Identifies pattern in shadows related to position of the sun in the provided illustrations (long to west, short and close, long to east).
- Makes connection between the sun's position in the sky and the resulting shadow.
- Chooses Meg's or Ben's blanket depending on the selected sun (#4, #5 or #6).
- Adequately explains how the pattern in the illustrations helped them make their selection

Other information teacher teams might find useful when preparing to use this task in the TCT process

- Teachers should read the task to the students as well as the writing prompts.
- If a word is unclear in the directions, teachers may paraphrase to make it more clear to the students.
- This is a **FORMATIVE** assessment which should be used to drive further science instruction.
- Possible student responses are only a guide; not to be used as a scoring guide.

Extensions and/or other uses after the task is implemented

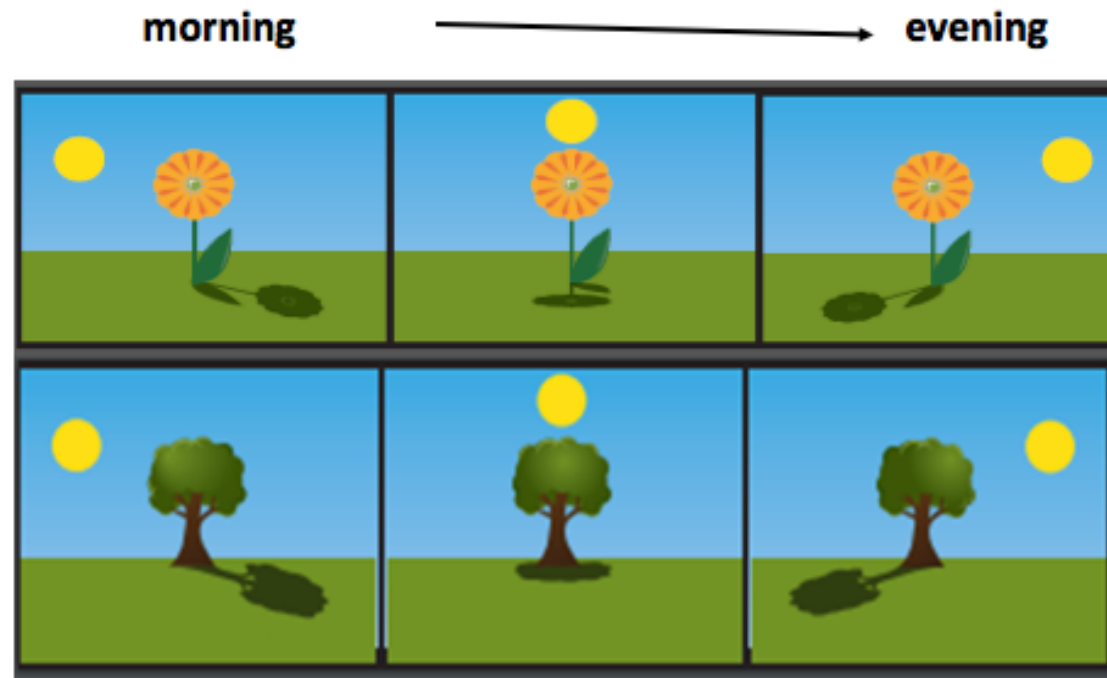
- Depending on student stamina, consider giving a section at a time, possibly on different days or administer in small groups.
- Be very intentional about using the same language that is used on the assessment.
- Add location or reference points around your school to make the assessment authentic as possible.
- Make ongoing observations throughout the year of the sun, shadows and how they (shadows) change over time;
<http://www.childrensuniversity.manchester.ac.uk/> tracking sunrise and sunset. Then in the spring, have students predict what will happen to the length of time between sunrise and sunset.

Through Course Task – Picnic Time

Name: _____

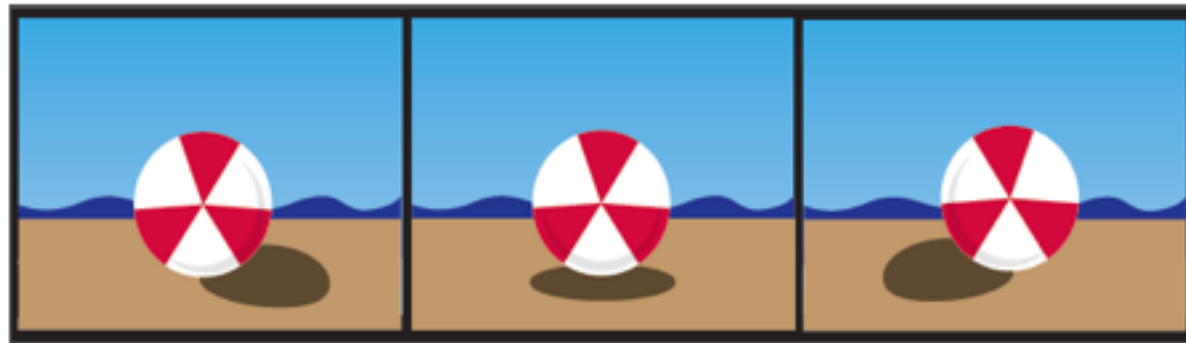
Situation:

Our class will be having a picnic lunch by the Gingko trees in front of our school. We want to have lunch in the shade. Study where the sun is in the pictures and the shadow patterns below at the different times in the day.



Now draw the sun in the beach ball pictures based on what you observed in the pictures of the flowers and the trees.

east



west

What pattern in the shadows do you observe?

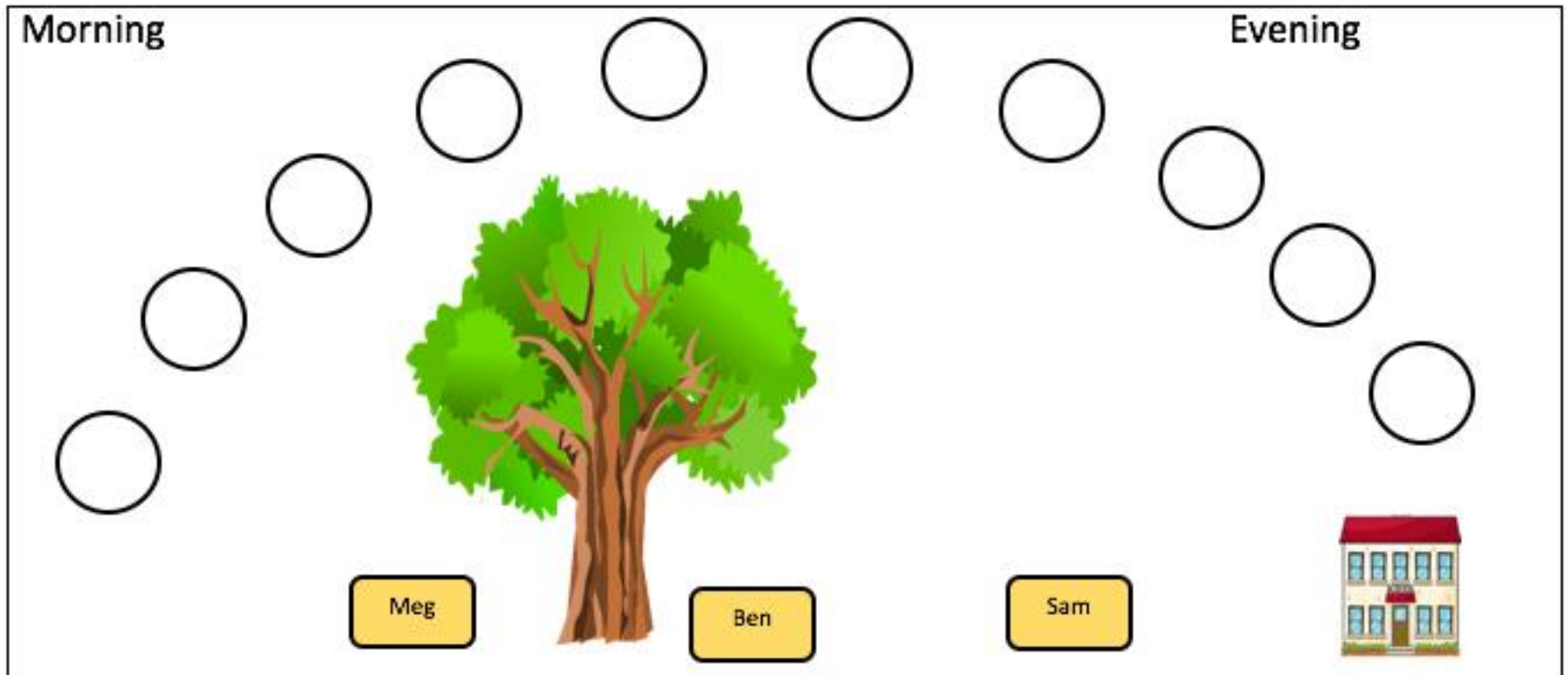
What does the pattern tell you about the relationship between the sun and the shadow?

Study the picture.

In the morning, the teacher sends Meg, Ben and Sam out to put blankets on the grass in an area that will be shaded at lunch time.

Color ONE circle that shows where the sun will be around lunch time.

Put an X on the blanket or blankets that will be in the shade.



Which of the blankets will be in the shade? _____

The pattern I observed in the shadow chart helped me know this because
