

Kentucky Academic Standards



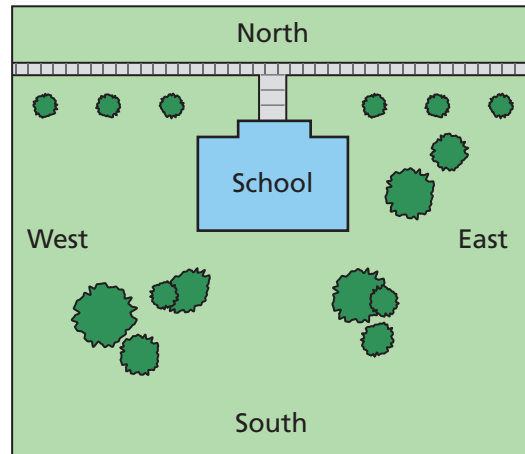
**Grade 4 Science
Released Items
2020**

Science

DIRECTIONS

Read all the information and the questions carefully.
Choose the best answer(s).

Students at the Science Academy have identified ways to make their school friendlier to the environment. They worked on science projects to improve the school.

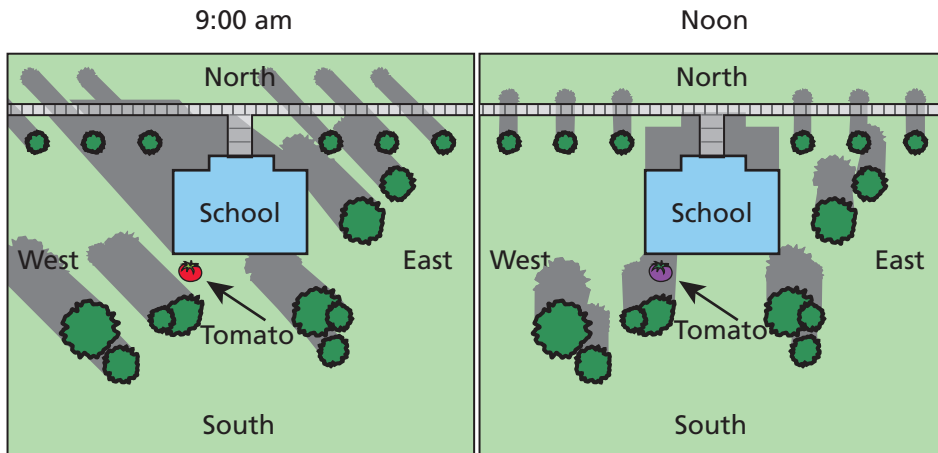





Morgan and Keaton decided to try using the school's campus to grow food that could be used by the school. The students identified some popular foods to plant.

Morgan and Keaton needed to decide where on campus to place their food gardens. "We need to mark where the plants go," said Keaton. Keaton saw a sunny area behind the school. "Tomatoes need a lot of sun, so let's plant them here." Keaton placed a tomato where he thought he would plant more. Morgan reminded Keaton that the sun may not always appear to be shining in the same place during the day. "Let's collect some data about the light and shade on our campus."

Morgan and Keaton sketched what they saw that morning. They returned and made more observations during lunch. Keaton saw that his tomato was now in the shade.

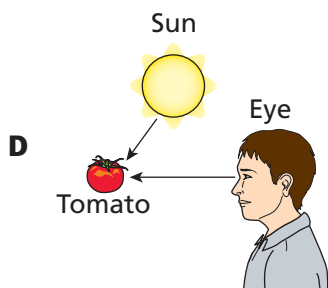
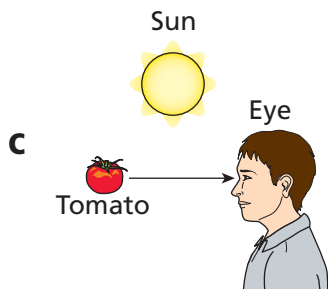
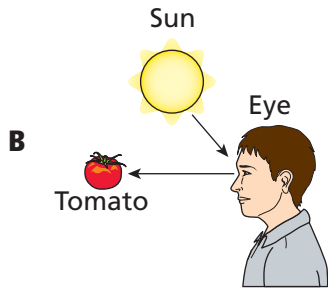
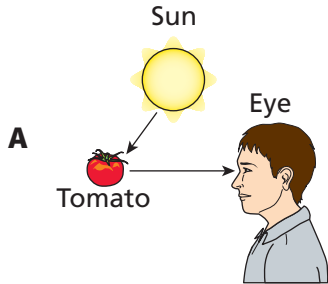
Top View of School Grounds



KEY	
	= shadow
	= grass
	= trees

1

The arrows in the drawings represent light rays. Which one model **best** represents why the students are able to see the tomato?



Both of the students agreed that the tomato didn't change from 9:00 am to noon, but it looked darker when they saw it at noon.

2

Which one statement **best** explains why the tomato appears darker at noon than 9:00 am?

- A** The reflected light from the tomato is darker in the shadow at noon.
- B** There is not as much reflected light from the tomato in the shadow at noon.
- C** Eyes adjust to objects in shadows so they seem darker.
- D** Tomatoes change to a darker color when they are in the shadow at noon.

Discussing why they could still see the tomato at noon led them to remember a room in the school that was designed to be completely dark inside. The room had no lights or windows, and walls that were painted black.

“Whoever painted that room didn’t understand much about light,” Keaton said. “It wouldn’t matter what color the paint was.”

3

Which one statement **best** supports Keaton’s claim?

- A** Black paint gives off only black light.
- B** There was no source of light in the room.
- C** Black walls reflect the light given off by the eyes.
- D** His claim was wrong; the black paint was a good idea.

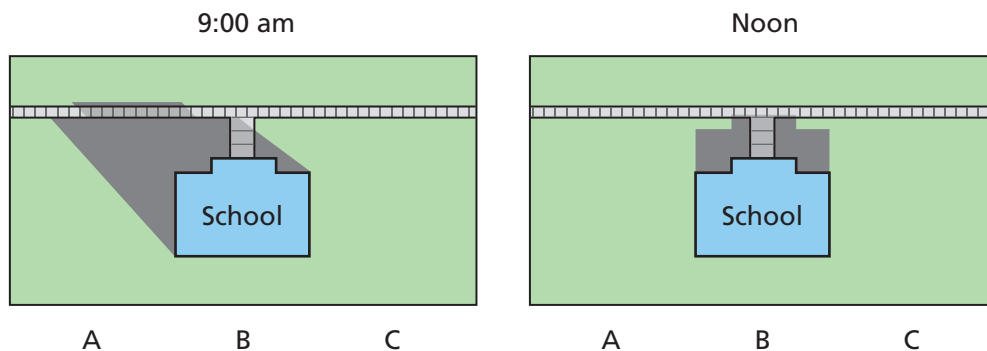
Morgan and Keaton shared their data with their friends to decide what places would be best for their garden. The friends suggested to consider what kinds of plants would be best for each location based on how much sun it gets.

Keaton forgot to show where the sun was located when they made their observations.

4

Using the information from Morgan and Keaton's observations, predict the one position from which the sun is **most likely** shining at each observation.

Top View of the School Grounds



- A** A at 9 A.M., B at noon
- B** B at 9 A.M., A at noon
- C** C at 9 A.M., B at noon
- D** B at 9 A.M., C at noon

Morgan and Keaton also wanted to lower the school's energy use. The school has decided to install solar panels to help produce electricity.

Solar panels work by converting the energy from sunlight into electricity that can be used to power the school. The teacher asked Morgan to use a light meter to measure the strength of sunlight at different locations and different times of day. This will help Morgan figure out the best place to place the solar panels so they can capture the most sunlight.

Please refer to the diagrams on pages 4 and 5 as needed.

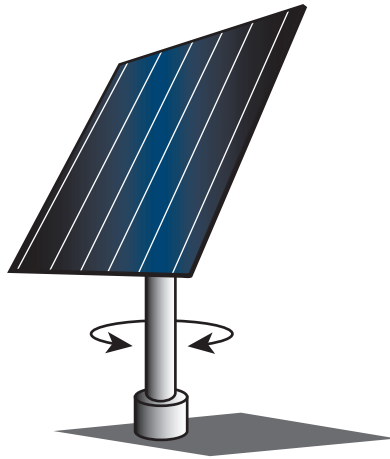
5

Part A. Based on the students' observations, predict where on the school campus and at what time the light meter would record the highest strength of sunlight.

Part B. Explain why this location would be the best for the solar panels and why the information from the light meter helps you to know that.

Write your answer on the next page.

The school needed to decide which direction the solar panels would face. One student suggested the solar panels should be mounted on swivel poles so that the panels could be rotated during the day. The class all agreed this was a good idea.



6

Which one statement **best** explains why mounting a solar panel on a swivel pole is a good idea?

- A** The solar panel can always be pointed directly at the sun.
- B** The solar panel can be rotated to avoid being blocked by storms.
- C** The solar panel can be rotated out of the shadows in the afternoon.
- D** The solar panel can swing with the wind to create maximum energy.

The students also looked at plans to reduce the amount of energy needed to power the school's lighting and to control the school's temperature.

To get the data they needed, they turned off the building's heating and cooling systems. They recorded the temperatures next to the windows in two classrooms.

Temperature Taken Next to Windows for Classrooms A and B

Classroom A	Temperature (°F)		Classroom B	Temperature (°F)
9:00 am	60		9:00 am	60
10:00 am	65		10:00 am	62
11:00 am	70		11:00 am	64
12:00 pm	71		12:00 pm	65
1:00 pm	72		1:00 pm	66
2:00 pm	73		2:00 pm	66
3:00 pm	74		3:00 pm	66
4:00 pm	73		4:00 pm	65
5:00 pm	72		5:00 pm	64

7

Which one statement **best** describes the direction that classroom A and classroom B are facing?

- A** Classroom A is facing south and Classroom B is facing north.
- B** Classroom A is facing east and Classroom B is facing north.
- C** Classroom A is facing west and Classroom B is facing south.
- D** Classroom A is facing north and Classroom B is facing south.

**DO NOT WRITE
ON THIS PAGE**

ACKNOWLEDGMENTS

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