Shadow Shapes

Graph a day of changing shadows

5.ESS1.2 "Represent data in graphical displays to reveal patterns of daily changes in the length and direction of shadows, in addition to different positions of the Sun, Moon, and stars at different times of the day, month, and year."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the times and shadow lengths in the passage, then circle the sentence that explains why shadows change direction. Use your marks to help you read the data.

A Stick in the Schoolyard

1 On a clear spring day, Maya places a straight stick in her schoolyard in the northern United States. She checks its shadow every two hours and measures from the stick to the shadow's tip. The table records her measurements and the shadow's approximate direction. The stick stays in the same spot all day.

MAYA'S SPRING SHADOW DATA

Time	Shadow length (cm)	Shadow direction	Sun's place in sky
8 a.m.	80	west	eastern part
10 a.m.	40	northwest	southeastern part
Noon	20	north	southern part
2 p.m.	40	northeast	southwestern part
4 p.m.	80	east	western part

2 To make a bar graph, Maya puts each time along the bottom and shadow length in centimeters up the side. She uses equal steps on the length scale so taller bars mean longer shadows. Looking across the bars in time order helps her see a pattern that one measurement alone could hide.

3 The Sun seems to move across the sky during the day because Earth turns. In this schoolyard, it appears in the eastern part of the sky in the morning and the western part later. A shadow points away from the Sun, so its direction changes too. Around midday, the Sun is high and shadows are shorter.

2 ANSWER WITH EVIDENCE

Use the passage

1. Which two times would have the tallest bars on a graph of Maya's data? How tall would those bars be?

2. If the bars are placed in time order, how would their heights change from 8 a.m. to 4 p.m.?

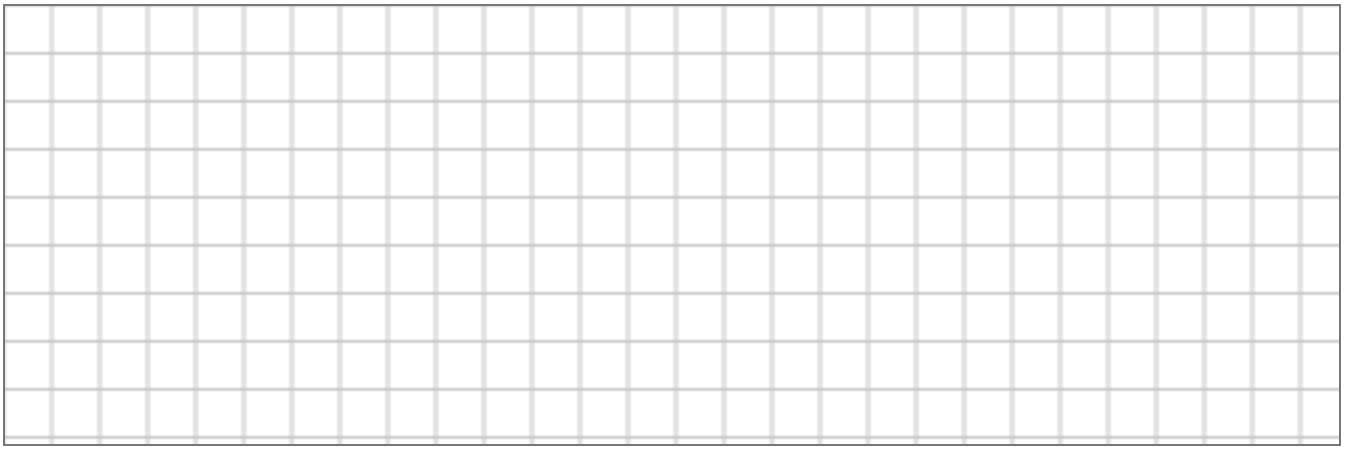
3. At which time would the shortest bar appear? What are the shadow's direction and the Sun's place in the sky then?

4. Which two times would have bars of equal height at 40 cm? How do the shadow directions differ?

3 YOUR TURN

Your own words

Use the grid to make a bar graph of all five shadow lengths. Label the times, use a height scale from 0 to 80 cm in steps of 20, write each shadow direction above its bar, and add one sentence below the graph describing the pattern.



ANSWER KEY

Shadow Shapes

GRADE 5 · 5.ESS1.2

PART 1 · READ AND MARK

Underline the times and shadow lengths in the passage, then circle the sentence that explains why shadows change direction. Use your marks to help you read the data. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Which two times would have the tallest bars on a graph of Maya's data? How tall would those bars be?	**8 a.m. and 4 p.m.; both bars would reach 80 cm.**
2	If the bars are placed in time order, how would their heights change from 8 a.m. to 4 p.m.?	**They would get shorter until noon, then get taller.**
3	At which time would the shortest bar appear? What are the shadow's direction and the Sun's place in the sky then?	**At noon; the shadow points north and the Sun is in the southern part of the sky.**
4	Which two times would have bars of equal height at 40 cm? How do the shadow directions differ?	**10 a.m. and 2 p.m.; the shadows point northwest and northeast, respectively.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Height scale: 0, 20, 40, 60, 80 cm. Bars in time order: 8 a.m., 80 cm (west); 10 a.m., 40 cm (northwest); noon, 20 cm (north); 2 p.m., 40 cm (northeast); 4 p.m., 80 cm (east). The shadows get shorter until noon, then grow longer.

Accept abbreviated direction labels if their meanings are clear. The graph must show all five values on a scale marked in steps of 20 cm.