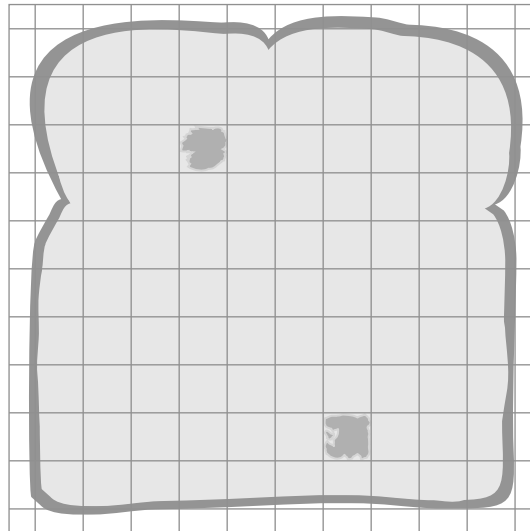## MOLDY BREAD

Ralph's teacher gave him a slice of bread with small spots of mold on it to do an experiment on mold. To do the experiment, Ralph used tracing paper that had a square grid printed on it. He placed the paper on the slice of bread and traced the bread outline. There were 100 squares covering the whole slice of bread, and 2 squares covered mold spots.


1   Ralph counted the number of squares covering the mold spots every day for 5 days.

Write **one** question that Ralph was trying to answer.

_____

_____

_____

The data Ralph collected is shown in the table below.

Time	Mold Size (in squares)
Day 1	2
Day 2	5
Day 3	8
Day 4	18
Day 5	41

2 On the grid below, create a **line graph** that shows the relationship between Time and Mold Size. **Be sure to title your graph, label each axis, and indicate the appropriate units for each axis.**

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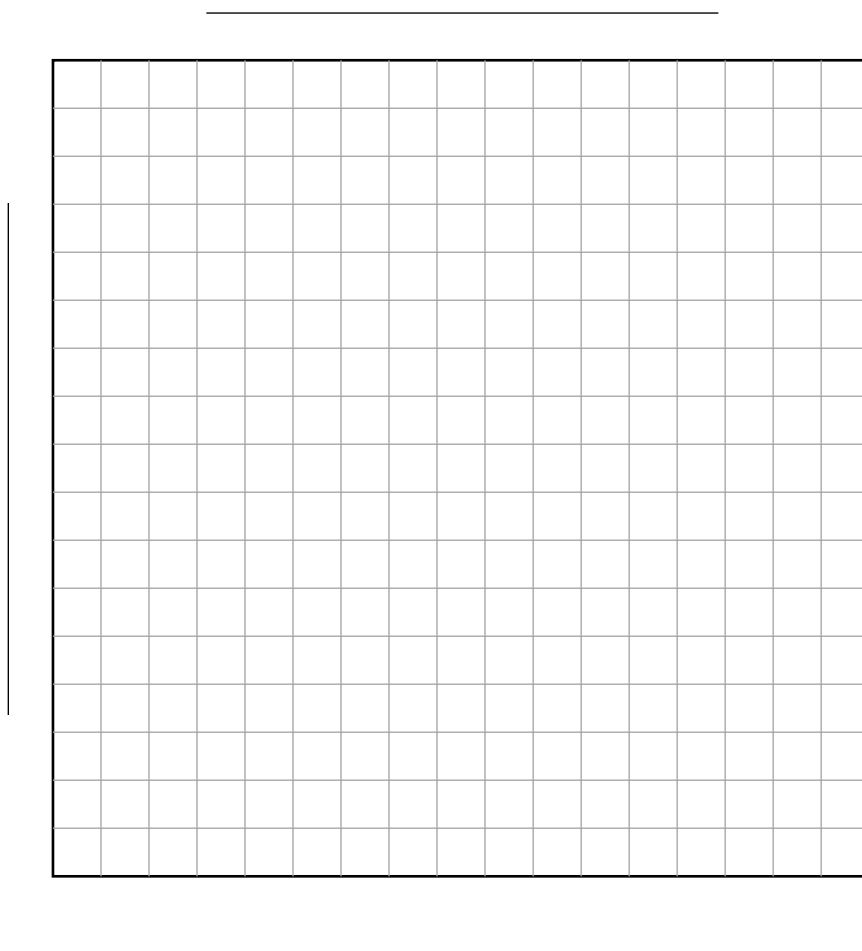
3   Using the table or your graph on page 2, estimate Mold Size on Day 6.

Estimate: _____

Explain your estimate.

_____

_____

_____

_____

Ralph decided to do another experiment. He took three slices of bread, each having mold spots covered by 2 squares. He put one slice in the oven at 200° F, one slice on the kitchen counter, and one slice in the refrigerator.

4   Write **one** hypothesis for Ralph's experiment.

_____

_____

Ralph measured the mold growth the same way he had done before. His results are shown in the table.

Day	Mold Size (in squares)		
	Slice in Oven	Slice on Kitchen Counter	Slice in Refrigerator
1	2	2	2
2	0	4	2
3	0	7	2
4	0	19	3
5	0	39	3

5   Write **one** conclusion that Ralph could draw based on his data.

_____

_____

_____

Item 1

Rubric

Key Elements:

---

any one of the following:

- Does the number of mold spots increase over time?
- Does mold grow in size over time?
- How does size of mold change with time?
- How many days does it take for the mold to cover the bread?
- What is the growth rate of mold?
- Any question relating the mold size/number of mold spots to time.

Score Points

1 point   one key element
0 points   other

Standard 1: Scientific Investigation
Benchmark 1.3: Asking questions and stating hypotheses that lead to different types of scientific investigations.
Subcontent Area: experimental design and investigations

Item 2

Rubric

Key Element	Acceptable examples	Unacceptable examples
Title	• Time vs. Mold Growth • Growth vs. Days • Mold Growth Rate • Time vs. Size	• Graph • Data Table • Mold Size • Mold Investigation
Length of Line	Line may extend beyond points in either direction.	If the line begins at 0 and connects with the five points, it is incorrect.
Space Utilization	• Scaled Day 1–Day 5 on x axis (each day after 2 or 3 lines) and 0–85 on the y axis (each line 5 squares) • Other scales that utilize more than half the graph space are acceptable	Scale using less than half the graph space.
Correct information on both x and y axis	Time on the x axis, Mold Size on the y axis	Words such as "Time" on the y axis and "Mold Size" on the x axis are not acceptable.
x axis labeled with units	• Days (squares if x axis label is Mold Size) • If the label is Time and divisions say Day 1, Day 2 . . .	Incorrect label.
y axis labeled with units	Squares (Days if the y axis is Time)	Incorrect or no label.
Data Plotted	Only the five mold sizes may be plotted.	Any other information plotted on either axis.

Score Points for graph format

2 points	six or more key elements
1 point	four or five key elements
0 points	three or fewer key elements/irrelevant, unclear, or inaccurate information

Score Points for graph accuracy

2 points   five data points plotted correctly with a line connecting the points

1 point   four data points plotted correctly with a line connecting the points **or**
all data points plotted correctly but not connected with a line

0 points   four data points plotted correctly but not connected with a line **or**
three or fewer data points plotted correctly with a line connecting the points **or**
irrelevant, unclear, or inaccurate information

Standard 1: Scientific Investigation

Benchmark 1.7: Communicating results of their investigation in appropriate ways.

Subcontent Area: results and data analysis

Item 3

Rubric

Key Elements:

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any number between 70 and 100

---

any one of the following:

- Mold size almost doubled every day.
- Any explanation indicating extrapolation of the line/curve.
- any explanation indicating that mold size is increasing with time (every day)

Score Points

2 points   two key elements
1 point   one key element
0 points   other

Standard 1: Scientific Investigation
Benchmark 1.6: Interpreting and evaluating data in order to formulate conclusions.
Subcontent Area: results and data analysis

Item 4

Rubric

Key Elements:

---

any one of the following:

- Temperature/location does not affect mold growth.
- Change in temperature/location changes the rate of mold growth.
- Mold growth will be best/worst at a specified place (counter/refrigerator/oven).
- any statement (not question) connecting temperature/location to growth rate of mold

---

Score Points

1 point   one key element
0 points   other

Standard 1: Scientific Investigation
Benchmark 1.3: Asking questions and stating hypotheses that lead to different types of scientific investigations.
Subcontent Area: experimental design and investigations

Item 5

Rubric

Key Elements:

any one of the following:

- Mold grows best at room temperature.
- Mold grows at different rates at different temperatures.
- Mold does not grow at 200° F.
- any reasonable conclusion that relates temperature/location to mold growth

Score Points

1 point	one key element
0 points	other

Standard 1: Scientific Investigation
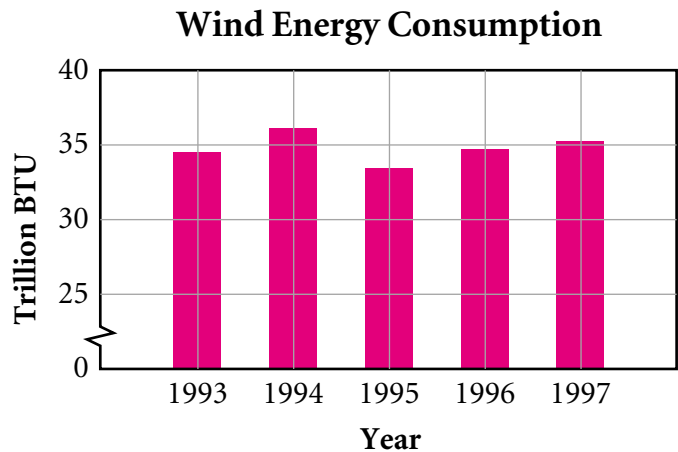Benchmark 1.6: Interpreting and evaluating data in order to formulate conclusions.
Subcontent Area: results and data analysis

6 The graph below shows the amount of wind energy consumption in the United States from 1993–1997.

Wind Energy Consumption

How much did wind energy consumption decrease from 1994 to 1995?

○ 1 trillion BTU

● 3 trillion BTU

○ 33 trillion BTU

○ 36 trillion BTU

Standard 1: Scientific Investigations
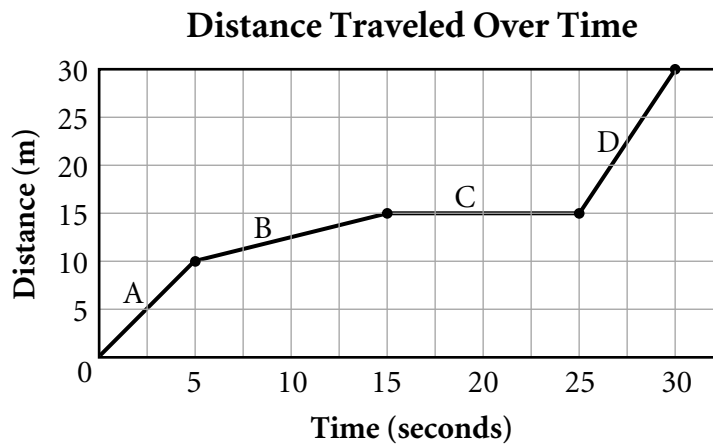Benchmark 1.6: Interpreting and evaluating data in order to formulate conclusions.
Subcontent Area: results and data analysis

*D*irections

The graph below shows the distance traveled over time by a student walking down a hall. Use the information shown on the graph to do Numbers 7 and 8.

Distance Traveled Over Time

7 During which time interval was the student moving the fastest?

○ A

○ B

○ C

● D

8 What was the average speed of the student from 0 seconds to 5 seconds?

Average speed: _____

Item 7
Standard 1: Physical Science
Benchmark 2.3.5: Describing, measuring, and calculating quantities that characterize moving objects and their interactions within a system.
Subcontent Area: physics

Item 8

Rubric

Key Elements:

- 2 meters/second
- 2m/s

Score Points

1 point   one key element
0 points   other

Standard 2: Physical Science
Benchmark 2.3.5: Describing, measuring, and calculating quantities that characterize moving objects and their interactions within a system.
Subcontent Area: physics

*D*irections

The following table lists characteristics of five different types of animals. Use the information in the table to do Numbers 9 and 10.

Characteristic	Type I	Type II	Type III	Type IV	Type V
Segments	Fewer than 5 segments	5 or more segments	Fewer than 5 segments	Fewer than 5 segments	5 or more segments
Antennae	One pair of antennae	One pair of antennae	No antennae	Two pairs of antennae	No antennae
Number of Legs	Fewer than 10 legs	10 or more legs	Fewer than 10 legs	10 or more legs	No legs
Mandibles	Yes	Yes	No	Yes	No
Exoskeleton	Yes	Yes	Yes	Yes	No
Wings	Yes	No	No	No	No

9 You observe an animal that has 20 body segments and has no mandibles. Which type of animal is it?

○ Type II

○ Type III

○ Type IV

● Type V

10 You observe an animal that has 12 legs and an exoskeleton. Which two types of animals could it be?

1)_____

2)_____

What additional information would allow you to decide which type of animal it is?

_____

_____

_____

Item 9
Standard 3: Life Science
Benchmark 3.1.1: Constructing and using classification systems based on the structure of an organism.
Subcontent Area: not assigned

Item 10

Rubric

Key Elements:

Type II and Type IV

any answer indicating one of the following:

- number of antennae
- number of body segments

Score Points

2 points	two key elements
1 point	one key element
0 points	other

Standard 3: Life Science
Benchmark 3.1.1: Constructing and using classification systems based on the structure of organisms.
Subcontent Area: not assigned

11 If the temperature of Earth rose over time, which of the following would occur?

○ Sea level would fall, and the polar ice caps would decrease in size.

○ Sea level would fall, and the polar ice caps would increase in size.

● Sea level would rise, and the polar ice caps would decrease in size.

○ Sea level would rise, and the polar ice caps would increase in size.

12 Which of these is an immediate result of the movement of tectonic plates?

○ ocean currents

● earthquakes

○ glaciers

○ tides

Item 11
Standard 4: Earth and Space Science
Benchmark 4.3.2: Describing the distribution and circulation of the world's water through oceans, glaciers, rivers, ground water, and atmosphere.
Subcontent Area: earth science

Item 12
Standard 4: Earth and Space Science
Benchmark 4.1.4: Explaining the distribution and causes of natural events.
Subcontent Area: earth science

13   Look at this list of renewable resources.

- biomass
- hydroelectric
- wind
- geothermal
- solar

Circle one of the renewable resources in the list and describe **one** negative impact of the use of this renewable resource.

_____

_____

Rubric

Key Elements:

Resource Type	*Matching Impact*
• biomass	air pollution, toxic chemicals
• hydroelectric	destroys fish habitat (e.g. salmon), prevents sediment transport to coasts
• wind	noise, unsightly windmills, kills birds
• geothermal	thermal pollution, smells bad
• solar	takes up space, looks bad, pollution from parts manufacturing

Note: For each resource type any other reasonable response may be accepted.

Score Points

1 point	one key element
0 points	other

Standard 5/6: Science and Technology
Benchmark 5.2: Describing advantages and disadvantages that might accompany the introduction of a new technology.
Subcontent Area: not assigned