

Infographics in the Classroom: Using Data Visualization to Engage in Scientific Practices

Activity 4: Graphing and Interpreting Data

In Activity 4, the class will compare different ways to graph the exact same data related to anchovy and sardine populations. What are the advantages and disadvantages of using columns, lines, or dots to indicate the amount of fish caught? How does graphing the data by months, years, or 5-year intervals tell a different story? Rather than provide completed graphs, you can have pairs of students work together to construct one type of graph, and then bring the entire class together to compare graphs critique their usefulness.

We've designed 12 sets of instructions that create different graphs from the same numbers, but you can use a smaller subset of these if you prefer. Any combinations leads to worthwhile discussion. You'll see the label in the upper right of each double-sided worksheet:

- Anchovy - Month - Dots
- Anchovy - Month - Lines
- Anchovy - Year - Dots
- Anchovy - Year - Lines
- Anchovy - 5 years - Lines
- Anchovy - 5 years - Bars
- Sardine - Month - Dots
- Sardine - Month - Lines
- Sardine - Year - Dots
- Sardine - Year - Lines
- Sardine - 5 years - Lines
- Sardine - 5 years - Bars

1. Briefly introduce the current problem: The increase in sea lion pup strandings. Use this video: <https://www.youtube.com/watch?v=JvDjwrrYPKI> and <http://www.today.com/video/today/51385416/#51385416>
2. What explanations does the story present for the increase in strandings? Do you see any visual representations of numbers?
3. Hand out the sardine/anchovy data to all students. Go through how to read the chart.
4. Hand out the 12 different sets of instructions. Allow the class to complete part 2 to look for patterns before graphing. Discuss in partners (with the same data).
5. Allow the class to follow their instructions for part 3 and create a graph (or do this for homework). They should answer questions in Part 4 as well.
6. Have students pair up with those who produced the same graph to check over each other's work. They should put a single post-it on the graph with a one sentence statement about the pattern that they observed.

7. Next bring together students with the same data to decide which graph conveys the information the best (there should be 6 groups: Sardines by month, year, 5-year; Anchovies by month, year, 5-year.) They should choose one and write on a post-it (of another color from the main conclusion) why they thought it was the best.
8. After these have been chosen, put them the Sardines/Anchovies by month near each other, the S/A by year in another part of the room and the S/A by 5-year in another.
9. Allow everyone to do a gallery walk to consider: How does the anchovy vs sardine populations (define this word if they don't know it) change over time? Discuss this as a class and have students consider the assumption they are making that the amount of caught fish gives a general sense of what is happening to the fish populations.
10. Use "Pick a Side" for the following statements:
 - Agree or disagree? Sardine and anchovy data stay the same over time.
 - Agree or disagree? Each graph of anchovy data has the same conclusion.
 - By month, year, or 5-year is the best way to compare the way sardine and anchovy population change over time.
11. Discuss possible explanations for the fluctuation of populations.

Activity 4

Graphing Data



Name _____

Date _____

Anchovy - Month - Dots

Part 1. Reading the Data Tables

- » Each **row** lists the number (in thousands of pounds) of fish caught in the **year** listed in the first column.
- » Each **column** lists the number (in thousands of pounds) of fish caught in the **month** listed in the top row.
- » **Check your understanding:** If you read the tables correctly, you will see that 19.7 thousand pounds of anchovies and 1 thousand pounds of sardines were caught in May 1994.
- » We have also provided you with the yearly totals in the last column and the monthly averages in the bottom row.

Part 2. Observing Patterns in the Numbers

To get a sense of how the fish catch changed over time, you can start at the top leftmost corner and read the data table just like you would read a written paragraph.

For now you will only be observing patterns in the **Anchovy Data Table**

<p>Are there certain months or seasons when more fish were caught? Describe your observations below.</p>	<p>Are there certain years when more fish were caught? Describe your observations below.</p>
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What other patterns do you observe?

Part 3. Visualizing your numbers

To better see how the fish catch changed over time, you will make a simple graph.

You will be making a graph with the Anchovy data by month.

- » You will only be graphing the months in the years 1997, 1998, and 1999.
- » Find the numbers you need from the table and write them in the simplified table below.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997												
1998												
1999												

1. On the provided graph paper, notice that the vertical axis has already been labeled for you. The numbers are in thousands of pounds of fish caught, just like your data table.
2. Label your horizontal axis along the bottom line. You will have to choose how to space out your months so that all of your data points will fit evenly across the graph. (*Hint: Count how many months you have and how many vertical lines go across the page.*) Your labels should be put in date order - January 1997 to December 1999.
3. For each number in your data table, draw a dot at the point that matches the date and the number of pounds of fish.
4. You are making a **dot graph**, so do not connect these dots with a line.
5. Don't forget to give your graph a meaningful title that will help viewers know what the graph shows.

Part 4. Observing Patterns in your Graph

Use your graph to see new patterns in the data.

What patterns do you notice in your graph? What happens to the amount of fish caught over time?

Look back to Part 2. Were these the same patterns you observed before visualizing them?	How does graphing the numbers help you see patterns?
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Activity 4

Graphing Data



Name _____

Date _____

Anchovy - Month - Lines

Part 1. Reading the Data Tables

- » Each **row** lists the number (in thousands of pounds) of fish caught in the **year** listed in the first column.
- » Each **column** lists the number (in thousands of pounds) of fish caught in the **month** listed in the top row.
- » **Check your understanding:** If you read the tables correctly, you will see that 19.7 thousand pounds of anchovies and 1 thousand pounds of sardines were caught in May 1994.
- » We have also provided you with the yearly totals in the last column and the monthly averages in the bottom row.

Part 2. Observing Patterns in the Numbers

To get a sense of how the fish catch changed over time, you can start at the top leftmost corner and read the data table just like you would read a written paragraph.

For now you will only be observing patterns in the **Anchovy Data Table**

<p>Are there certain months or seasons when more fish were caught? Describe your observations below.</p>	<p>Are there certain years when more fish were caught? Describe your observations below.</p>
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What other patterns do you observe?

Part 3. Visualizing your numbers

To better see how the fish catch changed over time, you will make a simple graph.

You will be making a graph with the Anchovy data by month.

- » You will only be graphing the months in the years 1997, 1998, and 1999.
- » Find the numbers you need from the table and write them in the simplified table below.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997												
1998												
1999												

1. On the provided graph paper, notice that the vertical axis has already been labeled for you. The numbers are in thousands of pounds of fish caught, just like your data table.
2. Label your horizontal axis along the bottom line. You will have to choose how to space out your months so that all of your data points will fit evenly across the graph. (*Hint: Count how many months you have and how many vertical lines go across the page.*) Your labels should be put in date order - January 1997 to December 1999.
3. For each number in your data table, draw a dot at the point that matches the date and the number of pounds of fish.
4. You are making a **line graph**, so connect these dots with a line.
5. Don't forget to give your graph a meaningful title that will help viewers know what the graph shows.

Part 4. Observing Patterns in your Graph

Use your graph to see new patterns in the data.

What patterns do you notice in your graph? What happens to the amount of fish caught over time?

Look back to Part 2. Were these the same patterns you observed before visualizing them?	How does graphing the numbers help you see patterns?
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Activity 4

Graphing Data



Name _____

Date _____

Anchovy - Year - Dots

Part 1. Reading the Data Tables

- » Each **row** lists the number (in thousands of pounds) of fish caught in the **year** listed in the first column.
- » Each **column** lists the number (in thousands of pounds) of fish caught in the **month** listed in the top row.
- » **Check your understanding:** If you read the tables correctly, you will see that 19.7 thousand pounds of anchovies and 1 thousand pounds of sardines were caught in May 1994.
- » We have also provided you with the yearly totals in the last column and the monthly averages in the bottom row.

Part 2. Observing Patterns in the Numbers

To get a sense of how the fish catch changed over time, you can start at the top leftmost corner and read the data table just like you would read a written paragraph.

For now you will only be observing patterns in the **Anchovy Data Table**

Are there certain months or seasons when more fish were caught? Describe your observations below.

Are there certain years when more fish were caught? Describe your observations below.

What other patterns do you observe?

Part 3. Visualizing your numbers

To better see how the fish catch changed over time, you will make a simple graph.

You will be making a graph with the Anchovy data by year.

- » You will be graphing each year's total anchovy catch.
- » Find the numbers you need from the table and write them in the simplified table below.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Yearly Total Fish Caught										

1. On the provided graph paper, notice that the vertical axis has already been labeled for you. The numbers are in thousands of pounds of fish caught, just like your data table.
2. Label your horizontal axis along the bottom line. You will have to choose how to space out your years so that all of your data points will fit evenly across the graph. (*Hint: Count how many years you have and how many vertical lines go across the page.*) Your labels should be put in date order - 1993-2002.
3. For each number in your data table, draw a dot at the point that matches the date and the number of pounds of fish.
4. You are making a **dot graph**, so do not connect these dots with a line.
5. Don't forget to give your graph a meaningful title that will help viewers know what the graph shows.

Part 4. Observing Patterns in your Graph

Use your graph to see new patterns in the data.

What patterns do you notice in your graph? What happens to the amount of fish caught over time?

Look back to Part 2. Were these the same patterns you observed before visualizing them?	How does graphing the numbers help you see patterns?
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Activity 4

Graphing Data



Name _____

Date _____

Anchovy - Year - Lines

Part 1. Reading the Data Tables

- » Each **row** lists the number (in thousands of pounds) of fish caught in the **year** listed in the first column.
- » Each **column** lists the number (in thousands of pounds) of fish caught in the **month** listed in the top row.
- » **Check your understanding:** If you read the tables correctly, you will see that 19.7 thousand pounds of anchovies and 1 thousand pounds of sardines were caught in May 1994.
- » We have also provided you with the yearly totals in the last column and the monthly averages in the bottom row.

Part 2. Observing Patterns in the Numbers

To get a sense of how the fish catch changed over time, you can start at the top leftmost corner and read the data table just like you would read a written paragraph.

For now you will only be observing patterns in the **Anchovy Data Table**

<p>Are there certain months or seasons when more fish were caught? Describe your observations below.</p>	<p>Are there certain years when more fish were caught? Describe your observations below.</p>
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What other patterns do you observe?

Part 3. Visualizing your numbers

To better see how the fish catch changed over time, you will make a simple graph.

You will be making a graph with the Anchovy data by year.

- » You will be graphing each year's total anchovy catch.
- » Find the numbers you need from the table and write them in the simplified table below.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Yearly Total Fish Caught										

1. On the provided graph paper, notice that the vertical axis has already been labeled for you. The numbers are in thousands of pounds of fish caught, just like your data table.
2. Label your horizontal axis along the bottom line. You will have to choose how to space out your years so that all of your data points will fit evenly across the graph. (*Hint: Count how many years you have and how many vertical lines go across the page.*) Your labels should be put in date order - 1993-2002.
3. For each number in your data table, draw a dot at the point that matches the date and the number of pounds of fish.
4. You are making a **line graph**, so connect these dots with a line.
5. Don't forget to give your graph a meaningful title that will help viewers know what the graph shows.

Part 4. Observing Patterns in your Graph

Use your graph to see new patterns in the data.

What patterns do you notice in your graph? What happens to the amount of fish caught over time?

Look back to Part 2. Were these the same patterns you observed before visualizing them?	How does graphing the numbers help you see patterns?
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Activity 4

Graphing Data



Name _____

Date _____

Anchovy - 5-years - Lines

Part 1. Reading the Data Tables

- » Each **row** lists the number (in thousands of pounds) of fish caught in the **year** listed in the first column.
- » Each **column** lists the number (in thousands of pounds) of fish caught in the **month** listed in the top row.
- » **Check your understanding:** If you read the tables correctly, you will see that 19.7 thousand pounds of anchovies and 1 thousand pounds of sardines were caught in May 1994.
- » We have also provided you with the yearly totals in the last column and the monthly averages in the bottom row.

Part 2. Observing Patterns in the Numbers

To get a sense of how the fish catch changed over time, you can start at the top leftmost corner and read the data table just like you would read a written paragraph.

For now you will only be observing patterns in the **Anchovy Data Table**

<p>Are there certain months or seasons when more fish were caught? Describe your observations below.</p>	<p>Are there certain years when more fish were caught? Describe your observations below.</p>
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What other patterns do you observe?

Part 3. Visualizing your numbers

To better see how the fish catch changed over time, you will make a simple graph.

You will be making a graph with the Anchovy data by 5-year totals.

- » You will be graphing two totals - 1993-1997 and 1998-2002
- » Find the yearly numbers you need from the table and draw a box around each of the two groups of five years (93-97 and 98-02).
- » Add the numbers together to fill in the chart below.

	Total Fish Caught (in thousands of pounds)
1993-1997	
1998-2002	

1. On the provided graph paper, notice that the vertical axis has already been labeled for you. The numbers are in thousands of pounds of fish caught, just like your data table.
2. Label your horizontal axis along the bottom line. Since you only have two different times, you can spread them out a bit, but you do not need to use the whole length of paper.
3. For each number in your data table, draw a dot at the point that matches the date and the number of pounds of fish.
4. You are making a **line graph**, so connect these dots with a line.
5. Don't forget to give your graph a meaningful title that will help viewers know what the graph shows.

Part 4. Observing Patterns in your Graph

Use your graph to see new patterns in the data.

What patterns do you notice in your graph? What happens to the amount of fish caught over time?

Look back to Part 2. Were these the same patterns you observed before visualizing them?	How does graphing the numbers help you see patterns?
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Activity 4

Graphing Data



Name _____

Date _____

Anchovy - 5-years - Bars

Part 1. Reading the Data Tables

- » Each **row** lists the number (in thousands of pounds) of fish caught in the **year** listed in the first column.
- » Each **column** lists the number (in thousands of pounds) of fish caught in the **month** listed in the top row.
- » **Check your understanding:** If you read the tables correctly, you will see that 19.7 thousand pounds of anchovies and 1 thousand pounds of sardines were caught in May 1994.
- » We have also provided you with the yearly totals in the last column and the monthly averages in the bottom row.

Part 2. Observing Patterns in the Numbers

To get a sense of how the fish catch changed over time, you can start at the top leftmost corner and read the data table just like you would read a written paragraph.

For now you will only be observing patterns in the **Anchovy Data Table**

Are there certain months or seasons when more fish were caught? Describe your observations below.

Are there certain years when more fish were caught? Describe your observations below.

What other patterns do you observe?

Part 3. Visualizing your numbers

To better see how the fish catch changed over time, you will make a simple graph.

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- » You will be graphing two totals - 1993-1997 and 1998-2002
- » Find the yearly numbers you need from the table and draw a box around each of the two groups of five years (93-97 and 98-02).
- » Add the numbers together to fill in the chart below.

	Total Fish Caught (in thousands of pounds)
1993-1997	
1998-2002	

1. On the provided graph paper, notice that the vertical axis has already been labeled for you. The numbers are in thousands of pounds of fish caught, just like your data table.
2. Draw one bar that reaches from the bottom axis to the first number (1993-1997 total). You can make this bar how ever wide you think looks good.
3. Draw a second bar to the right of the first that goes up to the second number (1998-2002 total) and is the same width as the first bar.
4. Label your horizontal axis along the bottom line.
5. Don't forget to give your graph a meaningful title that will help viewers know what the graph shows.

Part 4. Observing Patterns in your Graph

Use your graph to see new patterns in the data.

What patterns do you notice in your graph? What happens to the amount of fish caught over time?

Look back to Part 2. Were these the same patterns you observed before visualizing them?	How does graphing the numbers help you see patterns?
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Activity 4

Graphing Data



Name _____

Date _____

Sardine - Month - Dots

Part 1. Reading the Data Tables

- » Each **row** lists the number (in thousands of pounds) of fish caught in the **year** listed in the first column.
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- » **Check your understanding:** If you read the tables correctly, you will see that 19.7 thousand pounds of anchovies and 1 thousand pounds of sardines were caught in May 1994.
- » We have also provided you with the yearly totals in the last column and the monthly averages in the bottom row.

Part 2. Observing Patterns in the Numbers

To get a sense of how the fish catch changed over time, you can start at the top leftmost corner and read the data table just like you would read a written paragraph.

For now you will only be observing patterns in the **Sardine Data Table**

Are there certain months or seasons when more fish were caught? Describe your observations below.

Are there certain years when more fish were caught? Describe your observations below.

What other patterns do you observe?

Part 3. Visualizing your numbers

To better see how the fish catch changed over time, you will make a simple graph.

You will be making a graph with the Sardine data by month.

- » You will only be graphing the months in the years 1997, 1998, and 1999.
- » Find the numbers you need from the table and write them in the simplified table below.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997												
1998												
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1. On the provided graph paper, notice that the vertical axis has already been labeled for you. The numbers are in thousands of pounds of fish caught, just like your data table.
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3. For each number in your data table, draw a dot at the point that matches the date and the number of pounds of fish.
4. You are making a **dot graph**, so do not connect these dots with a line.
5. Don't forget to give your graph a meaningful title that will help viewers know what the graph shows.

Part 4. Observing Patterns in your Graph

Use your graph to see new patterns in the data.

What patterns do you notice in your graph? What happens to the amount of fish caught over time?

Look back to Part 2. Were these the same patterns you observed before visualizing them?	How does graphing the numbers help you see patterns?
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Activity 4

Graphing Data



Name _____

Date _____

Sardine - Month - Lines

Part 1. Reading the Data Tables

- » Each **row** lists the number (in thousands of pounds) of fish caught in the **year** listed in the first column.
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- » We have also provided you with the yearly totals in the last column and the monthly averages in the bottom row.

Part 2. Observing Patterns in the Numbers

To get a sense of how the fish catch changed over time, you can start at the top leftmost corner and read the data table just like you would read a written paragraph.

For now you will only be observing patterns in the **Sardine Data Table**

<p>Are there certain months or seasons when more fish were caught? Describe your observations below.</p>	<p>Are there certain years when more fish were caught? Describe your observations below.</p>
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What other patterns do you observe?

Part 3. Visualizing your numbers

To better see how the fish catch changed over time, you will make a simple graph.

You will be making a graph with the Sardine data by month.

- » You will only be graphing the months in the years 1997, 1998, and 1999.
- » Find the numbers you need from the table and write them in the simplified table below.

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1. On the provided graph paper, notice that the vertical axis has already been labeled for you. The numbers are in thousands of pounds of fish caught, just like your data table.
2. Label your horizontal axis along the bottom line. You will have to choose how to space out your months so that all of your data points will fit evenly across the graph. (*Hint: Count how many months you have and how many vertical lines go across the page.*) Your labels should be put in date order - January 1997 to December 1999.
3. For each number in your data table, draw a dot at the point that matches the date and the number of pounds of fish.
4. You are making a **line graph**, so connect these dots with a line.
5. Don't forget to give your graph a meaningful title that will help viewers know what the graph shows.

Part 4. Observing Patterns in your Graph

Use your graph to see new patterns in the data.

What patterns do you notice in your graph? What happens to the amount of fish caught over time?

Look back to Part 2. Were these the same patterns you observed before visualizing them?	How does graphing the numbers help you see patterns?
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Activity 4

Graphing Data



Name _____

Date _____

Sardine - Year - Dots

Part 1. Reading the Data Tables

- » Each **row** lists the number (in thousands of pounds) of fish caught in the **year** listed in the first column.
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Part 2. Observing Patterns in the Numbers

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Are there certain years when more fish were caught? Describe your observations below.

What other patterns do you observe?

Part 3. Visualizing your numbers

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- » You will be graphing each year's total Sardine catch.
- » Find the numbers you need from the table and write them in the simplified table below.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Yearly Total Fish Caught										

1. On the provided graph paper, notice that the vertical axis has already been labeled for you. The numbers are in thousands of pounds of fish caught, just like your data table.
2. Label your horizontal axis along the bottom line. You will have to choose how to space out your years so that all of your data points will fit evenly across the graph. (*Hint: Count how many years you have and how many vertical lines go across the page.*) Your labels should be put in date order - 1993-2002.
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What patterns do you notice in your graph? What happens to the amount of fish caught over time?

Look back to Part 2. Were these the same patterns you observed before visualizing them?	How does graphing the numbers help you see patterns?
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Activity 4

Graphing Data



Name _____

Date _____

Sardine - Year - Lines

Part 1. Reading the Data Tables

- » Each **row** lists the number (in thousands of pounds) of fish caught in the **year** listed in the first column.
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- » **Check your understanding:** If you read the tables correctly, you will see that 19.7 thousand pounds of anchovies and 1 thousand pounds of sardines were caught in May 1994.
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Part 2. Observing Patterns in the Numbers

To get a sense of how the fish catch changed over time, you can start at the top leftmost corner and read the data table just like you would read a written paragraph.

For now you will only be observing patterns in the **Sardine Data Table**

<p>Are there certain months or seasons when more fish were caught? Describe your observations below.</p>	<p>Are there certain years when more fish were caught? Describe your observations below.</p>
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What other patterns do you observe?

Part 3. Visualizing your numbers

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- » You will be graphing each year's total Sardine catch.
- » Find the numbers you need from the table and write them in the simplified table below.

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What patterns do you notice in your graph? What happens to the amount of fish caught over time?

Look back to Part 2. Were these the same patterns you observed before visualizing them?	How does graphing the numbers help you see patterns?
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Activity 4

Graphing Data



Name _____

Date _____

Sardine - 5-years - Lines

Part 1. Reading the Data Tables

- » Each **row** lists the number (in thousands of pounds) of fish caught in the **year** listed in the first column.
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- » **Check your understanding:** If you read the tables correctly, you will see that 19.7 thousand pounds of anchovies and 1 thousand pounds of sardines were caught in May 1994.
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Part 2. Observing Patterns in the Numbers

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What other patterns do you observe?

Part 3. Visualizing your numbers

To better see how the fish catch changed over time, you will make a simple graph.

You will be making a graph with the Sardine data by 5-year totals.

- » You will be graphing two totals - 1993-1997 and 1998-2002
- » Find the yearly numbers you need from the table and draw a box around each of the two groups of five years (93-97 and 98-02).
- » Add the numbers together to fill in the chart below.

	Total Fish Caught (in thousands of pounds)
1993-1997	
1998-2002	

1. On the provided graph paper, notice that the vertical axis has already been labeled for you. The numbers are in thousands of pounds of fish caught, just like your data table. However, since your data goes up higher than one sheet of paper, you will need a second page to tape on to the top. Re-label the correct scale on your second sheet (which will be from 2000-4000).
2. Label your horizontal axis along the bottom line. Since you only have two different times, you can spread them out a bit, but you do not need to use the whole length of paper.
3. For each number in your data table, draw a dot at the point that matches the date and the number of pounds of fish.
4. You are making a **line graph**, so connect these dots with a line.
5. Don't forget to give your graph a meaningful title that will help viewers know what the graph shows.

Part 4. Observing Patterns in your Graph

Use your graph to see new patterns in the data.

What patterns do you notice in your graph? What happens to the amount of fish caught over time?

Look back to Part 2. Were these the same patterns you observed before visualizing them?	How does graphing the numbers help you see patterns?
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Activity 4

Graphing Data



Name _____

Date _____

Sardine - 5-years - Bars

Part 1. Reading the Data Tables

- » Each **row** lists the number (in thousands of pounds) of fish caught in the **year** listed in the first column.
- » Each **column** lists the number (in thousands of pounds) of fish caught in the **month** listed in the top row.
- » **Check your understanding:** If you read the tables correctly, you will see that 19.7 thousand pounds of anchovies and 1 thousand pounds of sardines were caught in May 1994.
- » We have also provided you with the yearly totals in the last column and the monthly averages in the bottom row.

Part 2. Observing Patterns in the Numbers

To get a sense of how the fish catch changed over time, you can start at the top leftmost corner and read the data table just like you would read a written paragraph.

For now you will only be observing patterns in the **Sardine Data Table**

Are there certain months or seasons when more fish were caught? Describe your observations below.

Are there certain years when more fish were caught? Describe your observations below.

What other patterns do you observe?

Part 3. Visualizing your numbers

To better see how the fish catch changed over time, you will make a simple graph.

You will be making a graph with the Sardine data by 5-year totals.

- » You will be graphing two totals - 1993-1997 and 1998-2002
- » Find the yearly numbers you need from the table and draw a box around each of the two groups of five years (93-97 and 98-02).
- » Add the numbers together to fill in the chart below.

	Total Fish Caught (in thousands of pounds)
1993-1997	
1998-2002	

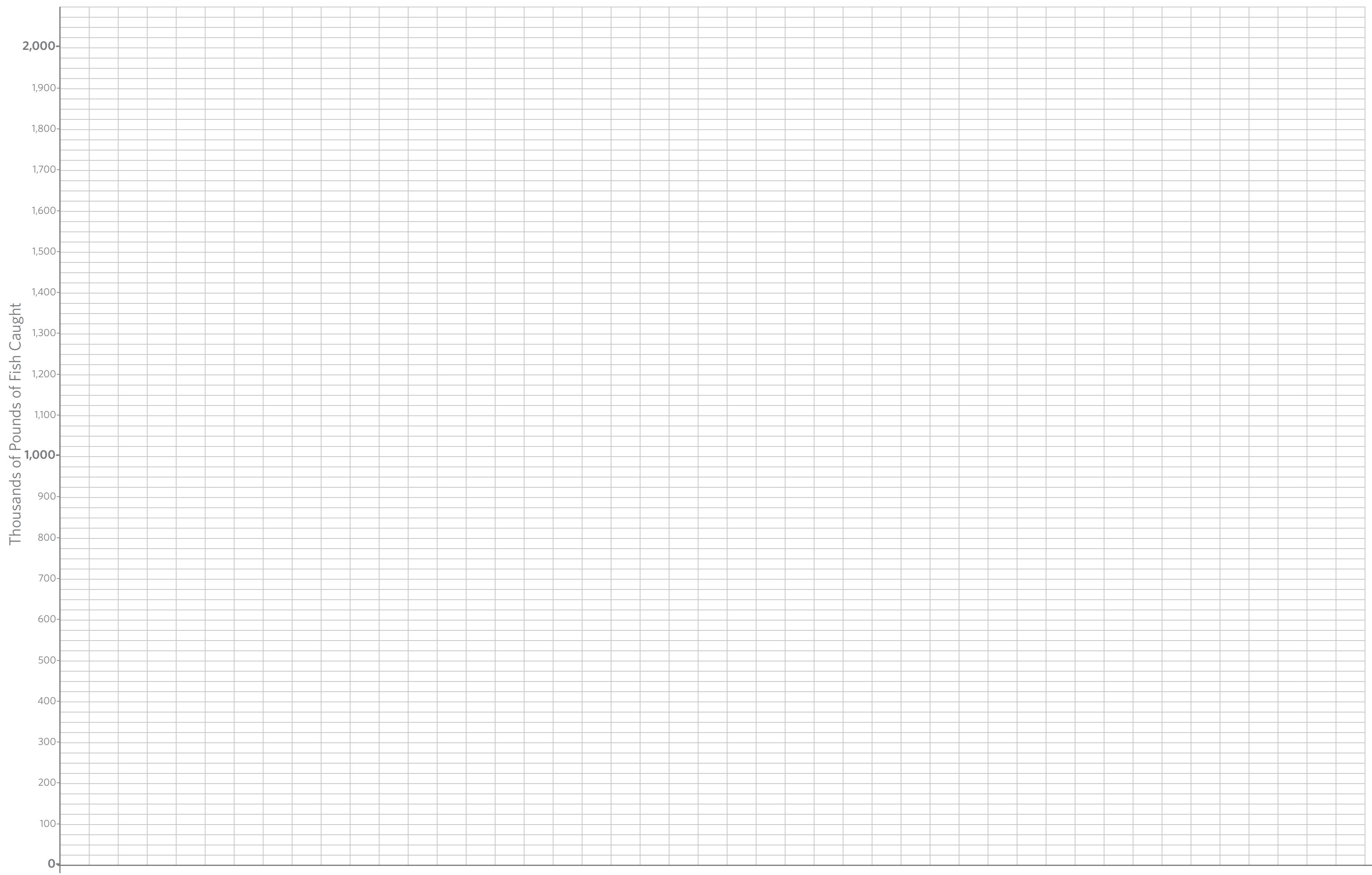
1. On the provided graph paper, notice that the vertical axis has already been labeled for you. The numbers are in thousands of pounds of fish caught, just like your data table. However, since your data goes up higher than one sheet of paper, you will need a second page to tape on to the top. Re-label the correct scale on your second sheet (which will be from 2000-4000).
2. Draw one bar that reaches from the bottom axis to the first number (1993-1997 total). You can make this bar how ever wide you think looks good.
3. Draw a second bar to the right of the first that goes up to the second number (1998-2002 total) and is the same width as the first bar.
4. Label your horizontal axis along the bottom line.
5. Don't forget to give your graph a meaningful title that will help viewers know what the graph shows.

Part 4. Observing Patterns in your Graph

Use your graph to see new patterns in the data.

What patterns do you notice in your graph? What happens to the amount of fish caught over time?

Look back to Part 2. Were these the same patterns you observed before visualizing them?	How does graphing the numbers help you see patterns?
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Monthly thousands of pounds of **Anchovies** caught in the San Francisco Bay Area

Jan 1993 - Dec 2002, data collected from the CA Dept. of Fish and Game

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
1993	0	0	0	0	0	117.3	213.3	83.0	35.2	88.9	0	0	537.74
1994	0	0	0	0	19.7	270.4	326.3	0	0	0	0	0	616.5
1995	0	0	0	0	1.9	199.7	3.9	0	0	0	0	0	205.5
1996	0	0	0	0	46.8	79.8	38.2	63.7	3.3	0	0	0	231.8
1997	0	0	0	33.0	131.4	167.6	4.0	2.3	4.0	1.0	0	0	343.3
1998	0	0	0	0	0	0	0	0	1.0	0	0	0	1.0
1999	0	0	0	0	0	40.9	44.2	1.9	15.8	0	0	0	102.7
2000	0	0	0	0	99.1	131.1	26.6	0	0	0	0	0	256.8
2001	0	0	0	0	0	0	0.8	2.1	10.2	4.7	0	0	17.8
2002	0	0	0	11.1	14.1	12.7	0	0	0	0	0	0	37.9
													Yearly Average
Monthly Average	0	0	0	4.4	31.3	102.0	65.7	15.3	6.9	9.5	0	0	235.1

Monthly thousands of pounds of **Sardines** caught in the San Francisco Bay Area

Jan 1993 - Dec 2002, data collected from the CA Dept. of Fish and Game

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
1993	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	1.0	0.6	0.1	0	0	0	0	0	1.7
1995	0	0	0	0	0	0	3.2	0.3	0	0	0	0	3.5
1996	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	1.1	2.4	3.3	0	0	0	6.8
1998	0	0	0	0	0	0	0	0	26.4	798.9	196.7	0	1,021.9
1999	0	0	0	0	0	0	0	0	2,091.1	0.9	0	0	2,092.1
2000	0	0	0	0	0.1	0.9	0	0	0	0	0	0	1.0
2001	0	0	0	0	0	0	0	0.1	0	0	0	0	0.1
2002	0.2	0	0	0.1	0.1	0	0	211.9	36.6	129.9	0	0	378.7
													Yearly Average
Monthly Average	0	0	0	0	0.1	0.2	0.4	21.5	215.7	93.0	19.7	0	350.6

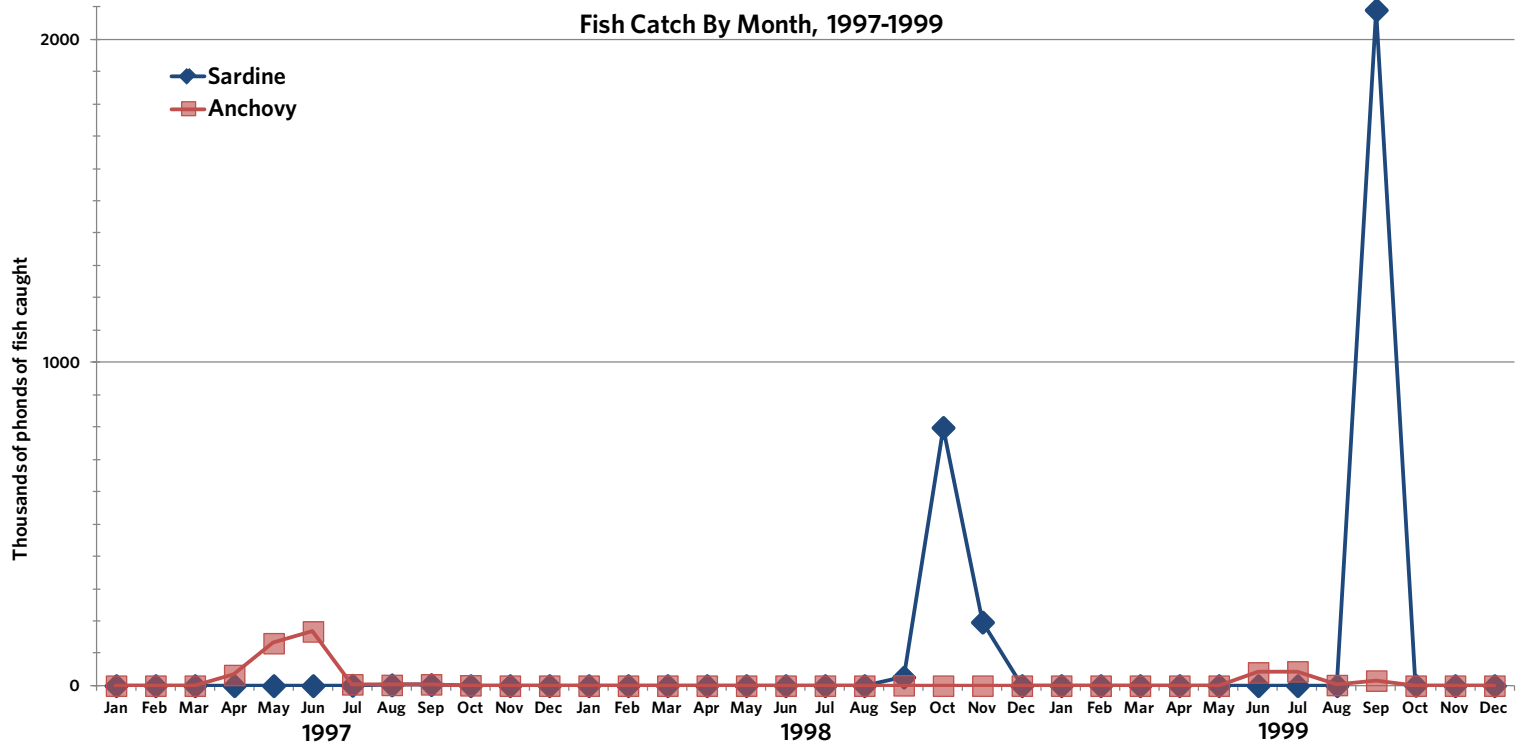
Activity 5

Fish Population Data Stories

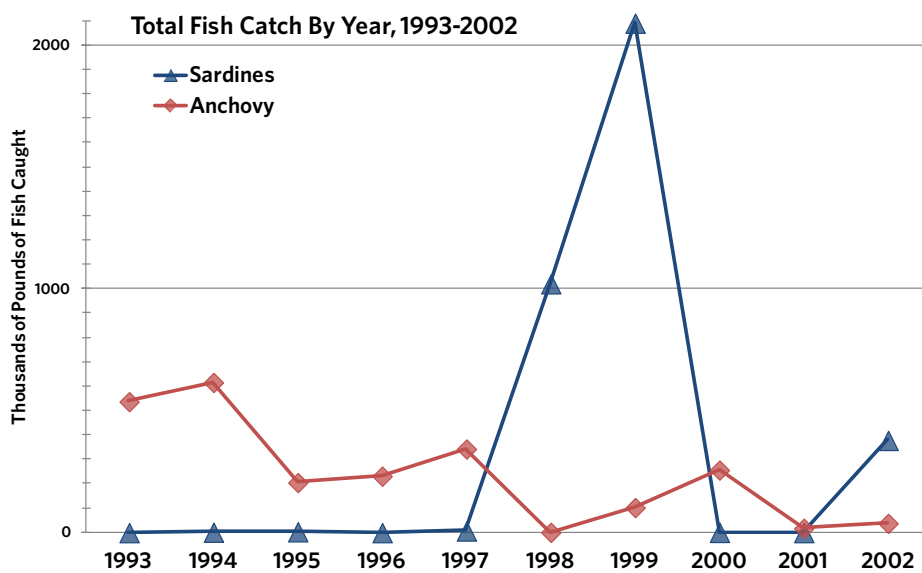
Summary Graphs



A. by Month



B. By Year



C. By 5-years

