Representing Data

Ask a question

Test the hypothesis

Organize Data

Conclude

How do scientists make sense of data?

- There are many different types of investigations, but all have one thing in common – they all collect data.
- Data are the facts and figures – the evidence that is gathered
- The more data collected, the stronger the evidence – however – that data needs to be organized!
- How to do it? The most common method is with a data table.

Data table set up:

Guidelines for Making a Data Table

In most cases, the independent variable (that which you purposefully change) is in the left column, the dependent variable (that which you measure) with the different trials is in the next columns, and the derived or calculated column (often average) is on the far right. Reaffirm that rows are a series of horizontal cells and that columns are a series of vertical cells.

Title: Clearly state the purpose of the experiment (e.g., The effect of _____ (independent variable) on _____ (dependent variable).

Independent Variable (unit)	Dependent Variable (unit)			Derived Quantity (unit)
	Trial 1	ial 2	Trial 3	

Note: This data table format is adapted from *Students and Research* (Cothron, Giese, and Rezba, 2000).

Data table example:

Example
Title: The pH of Common Household Substances

Substance	pH			Average pH
	Trial 1	Trial 2	Trial 3	
Lemon juice	2.4	2.0	2.2	2.2
Baking soda	8.4	8.3	8.7	8.5
Orange juice	3.5	4.0	3.4	3.6

Independent Variable

Dependent Variable

Graphs and Data

- Graphing requirements –

1. Axis labels
2. Unit designations
3. Title
4. Legend or key

- An explanation about the results, or what the graph shows

Graphs Handout:

- Let's read through and find the important information, then take look at the example graphs

Graphing and Analyzing Scientific Data

Graphing is an important procedure used by scientist to display the data that is collected during a controlled experiment. There are three main types of graphs:

Pie/circle graphs: Used to show parts of a whole.

Bar graphs: Used to compare amounts.

Line graphs: Use to show the change of one piece of information as it relates to another change.

Both bar and line graphs have an "X" axis (horizontal) and a "Y" axis (vertical).

Parts of a Graph:

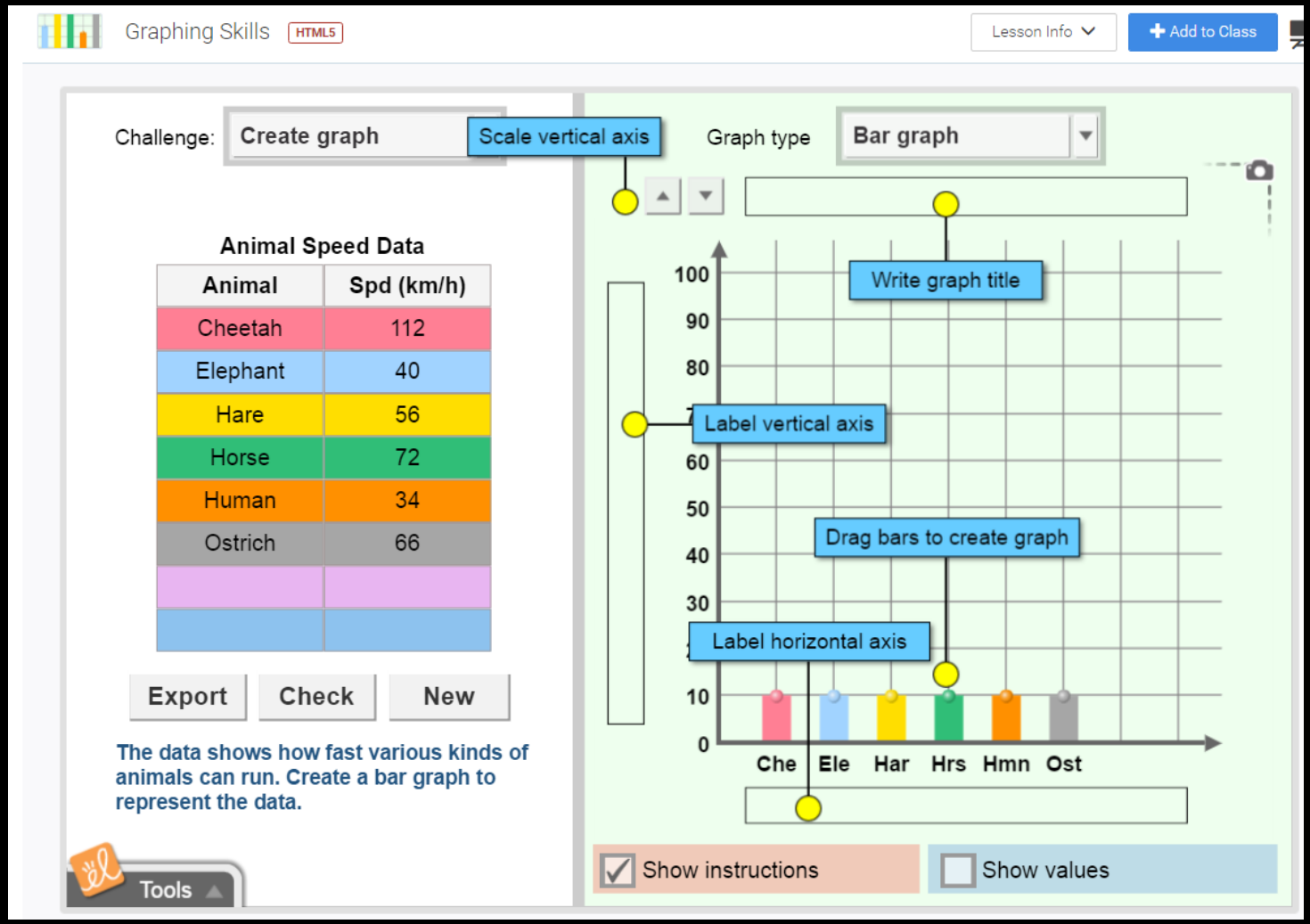
Title: Summarizes information being represented in ANY graph.

Independent Variable: The variable that is controlled by the experimenter, such as, time, dates, depth, and temperature. This is placed on the X axis.

Dependent Variable: The variable that is directly affected by the I.V. It is the result of what happens as time, dates, depth and temperature are changed. This is placed on the Y axis.

Scales for each Variable: In constructing a graph, one needs to know where to plot the points representing the data. In order to do this a scale must be employed to include all the data points. This must also take up a conservative amount of space. It is not suggested to have a run on scale making the graph too hard to manage. The scales should start with 0 and climb in intervals such as, multiples of 2, 5, 10, 20, 25, etc...the scale of numbers will be determined by your data values.

Now for our first Gizmo Lab!



Lab Page – how to read gizmo lab pages:

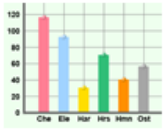
- Prior knowledge section – do BEFORE starting the lab
- Let's do this now.

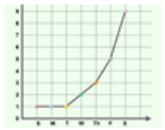
Student Exploration: Graphing Skills

Vocabulary: bar graph, line graph, negative relationship, pie chart, positive relationship, scale, scatter plot, variable

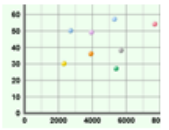
Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

1. Four kinds of graphs are shown in this Gizmo. Circle the kinds you have seen before.


Bar graph


Line graph


Pie chart


Scatter plot

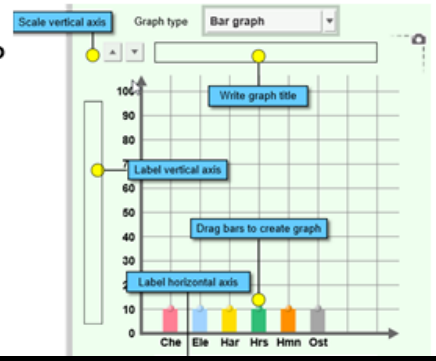
2. Where have you seen graphs used? _____

_____

3. Why do you think graphs are useful? _____

Gizmo Warm-up: Using the *Graphing Skills* Gizmo

1. The *Graphing Skills* Gizmo™ starts with a bar graph on the right and a data set on the left. Practice using the Gizmo by doing the following:
   - Write a title.
   - Label the vertical and horizontal axes.
   - Change the **scale** of the vertical axis.
   - Drag the bars up and down.



Warm up

- This section usually helps you to understand how that particular lab works
- It's practice before applying

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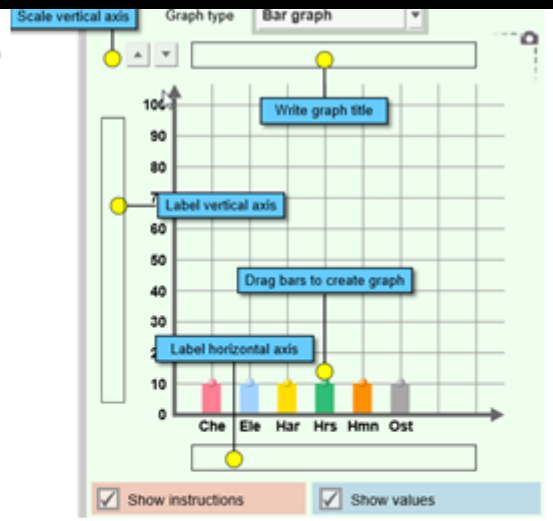
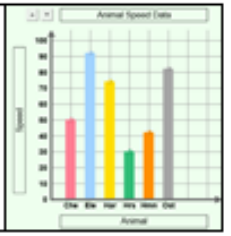


2. Use the **Graph type** dropdown list to select other kinds of graphs. Practice with each type of graph:
   - On the **Line graph** drag the points up and down.
   - On the **Pie chart** change the size of each slice by dragging the edges.
   - On the **Scatter plot** drag points from the data table to the graph.

The rest of the pages:

- Check out the boxes at the top of each page – the instructions help you to figure out how to set up the settings to get the proper results.
- It also tells you the goal of the activity

Activity A: **Bar graphs**	Get the Gizmo ready: • On the **Challenge** menu, select **Create graph**. • On the **Graph type** menu, select **Bar graph**. • If necessary, click **New** until **Animal speed data** appears.	

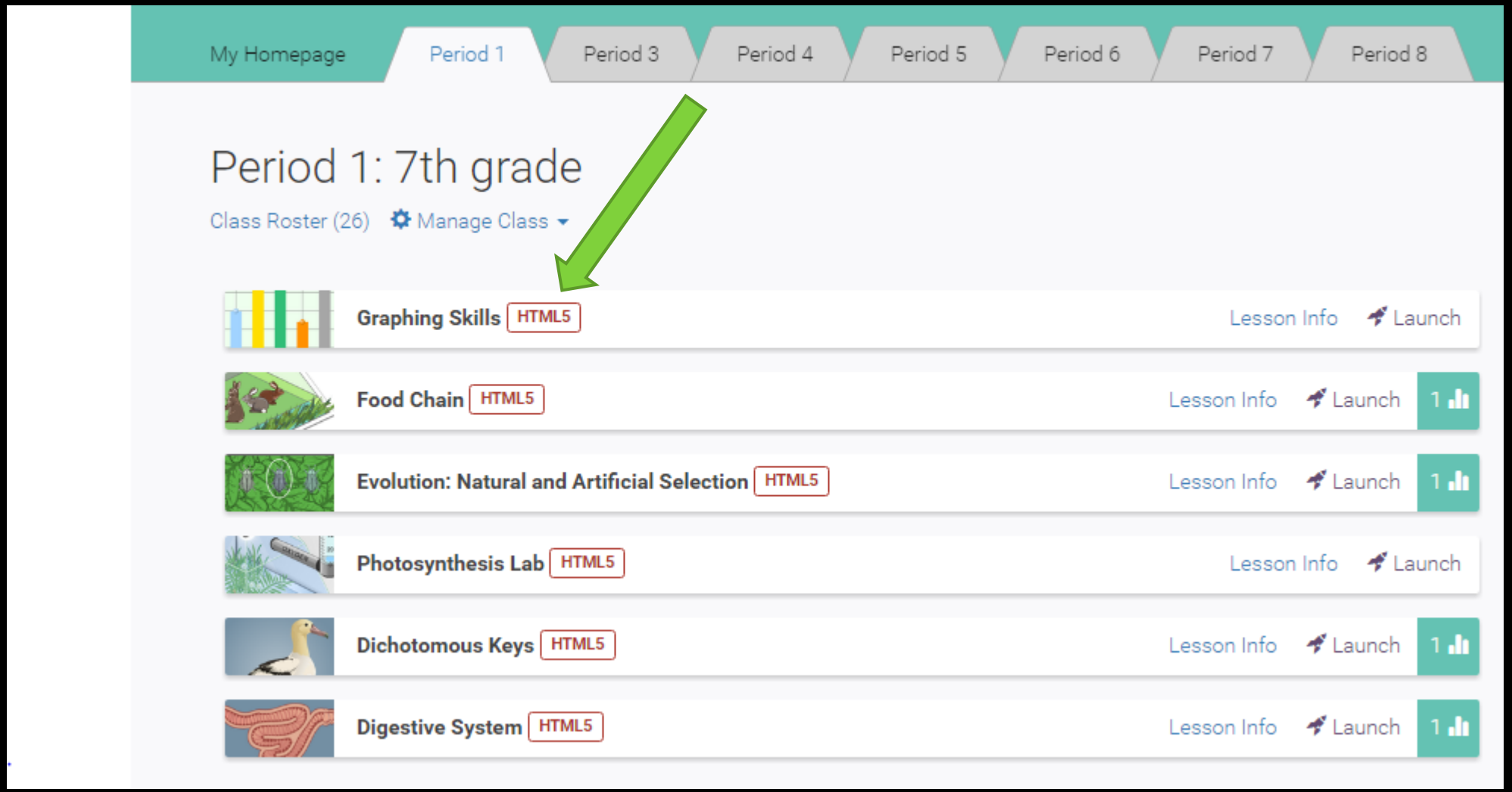
Goal: Build a bar graph based on a data table.

Gizmo Lab instructions:

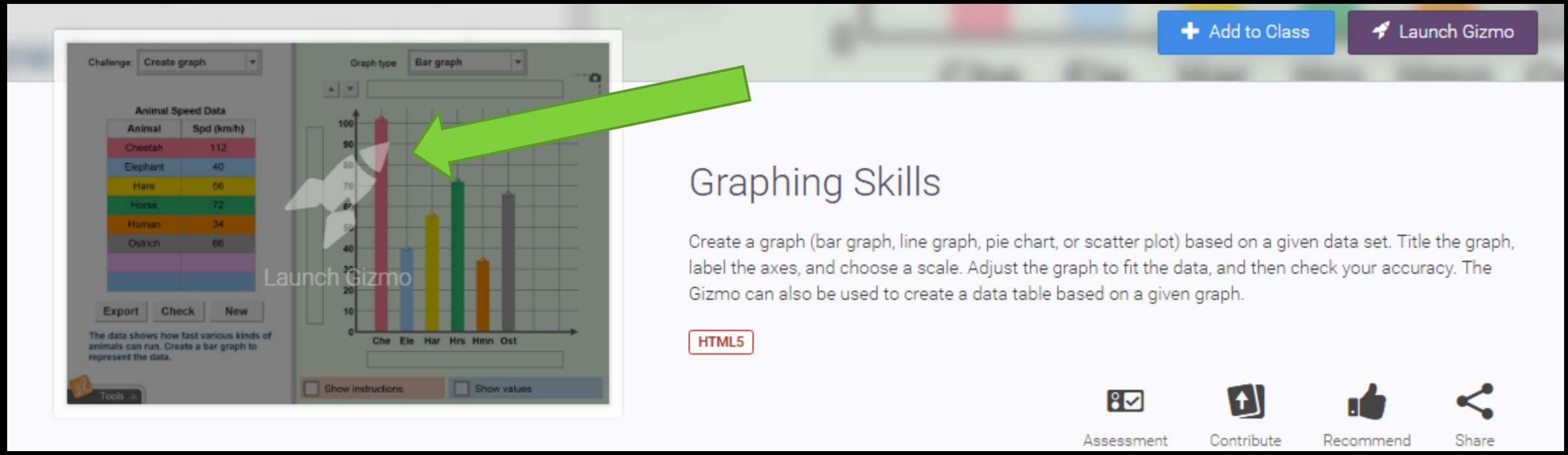
- One you have your assigned computer, go through these steps:

1. Find your passwords page in your binder
2. Log on to the internet and then go to teacher's website
3. Once on the website, go to the current unit (1) and scroll down the page until your see the gizmo lab button
4. When you click the button, it will take you to the explore learning website.
5. Log in with your user name and password

Find your class, there are a list of labs, look for the graphing skills lab and click on “HTML5”



Here is the lab, click on “Launch Gizmo” to start the lab



Follow along on your page to complete the lab

Complete lab:

Name: _____ Date: _____

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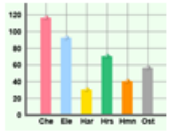
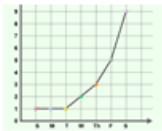
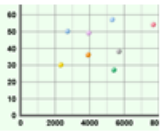

Bar graph


Line graph


Pie chart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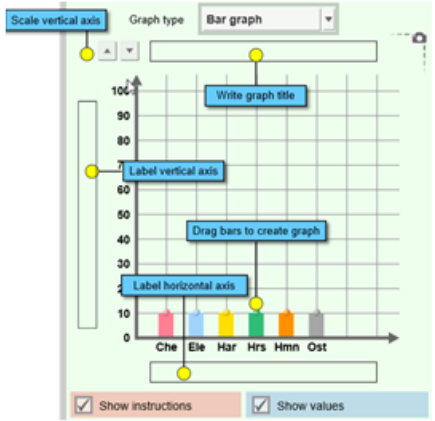

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