



Lesson Question



Lesson Goals

Analyze data to determine their validity and .

Predict in data from charts and graphs.

Examine data to draw and formulate conclusions.



Words to Know

Fill in this table as you work through the lesson. You may also use the glossary to help you.

qualitative data	a type of non-numerical, <input type="text"/> data
quantitative data	a type of <input type="text"/> data that can be measured



Experimental Design Principles

- Different follow a similar method.
- Good design and repeatability ensure results.
 - Repetition and increases confidence in the results.
 - Replication should produce the .

- Data must be reliable and .
- is the closeness of measured values to the accepted value.
- Precision is the closeness of to other measured values.
- Reproducibility is the ability of data to be .

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Valid vs. Invalid Data

- Valid data can be and reproduced by the researcher and other scientists.
- data may result from:
 - data.
 - data.
 - measurement or recording .
 - the to reproduce data.

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Data Analysis

- data can be but not measured.
- data are data that can be .

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Words to Know

Write the letter of the definition next to the matching word as you work through the lesson. You may use the glossary to help you.

_____ nonlinear

A. not forming a straight line

_____ probability

B. forming a straight line

_____ graph

C. the likelihood that a given event will occur

_____ linear

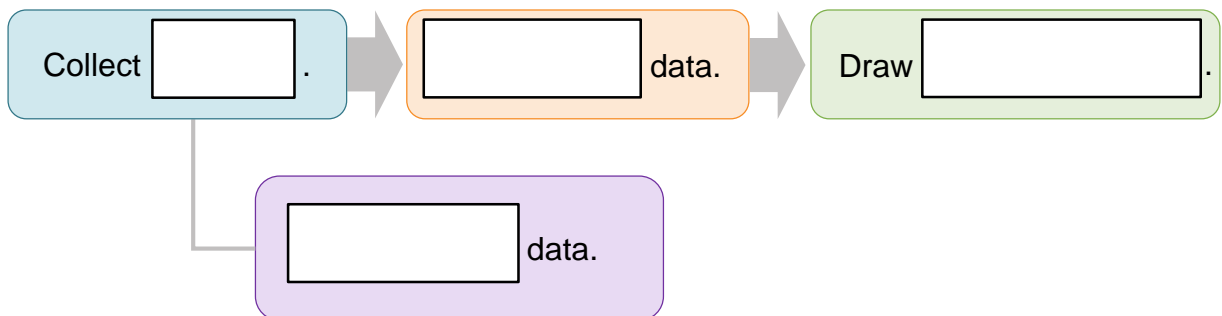
D. to examine in detail

_____ analyze

E. a visual representation of data

Data Analysis

Write the correct phrase into the boxes in the flow diagram.



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Types of Graphs

A is a visual representation of data.

- complicated facts
- in a variety of ways

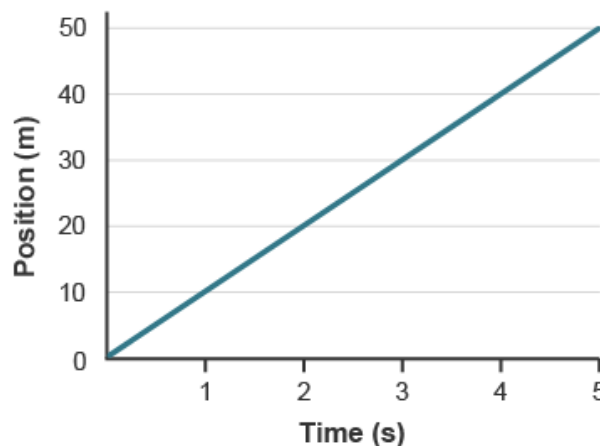
Line Graphs

graphs show changes over a period of time.

- The x -axis displays .
- The y -axis shows what is being .

They may be or .

Position vs. Time



- This graph shows a linear relationship between the position of the object and time. Based on the pattern shown here, you could predict that the object will continue moving at a rate of 10 m/s.

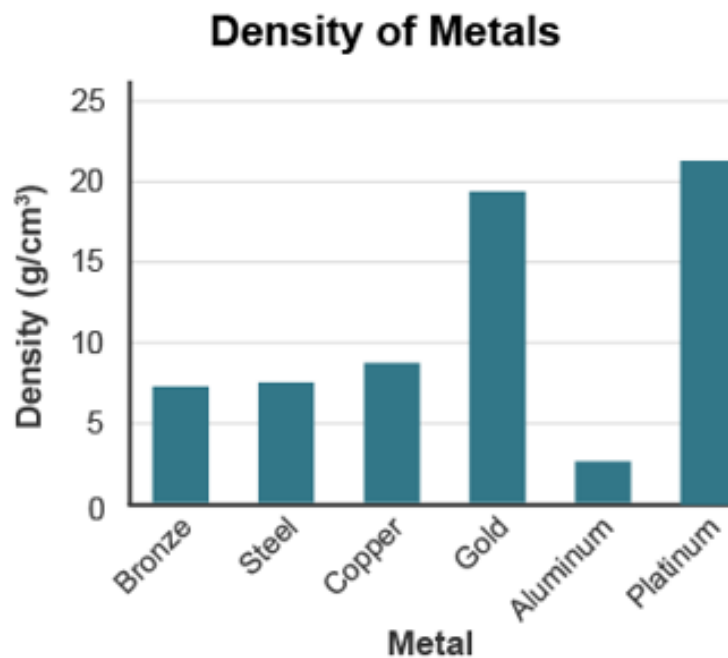
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Bar Graphs

graphs quantities for particular categories.

- Used to see quickly



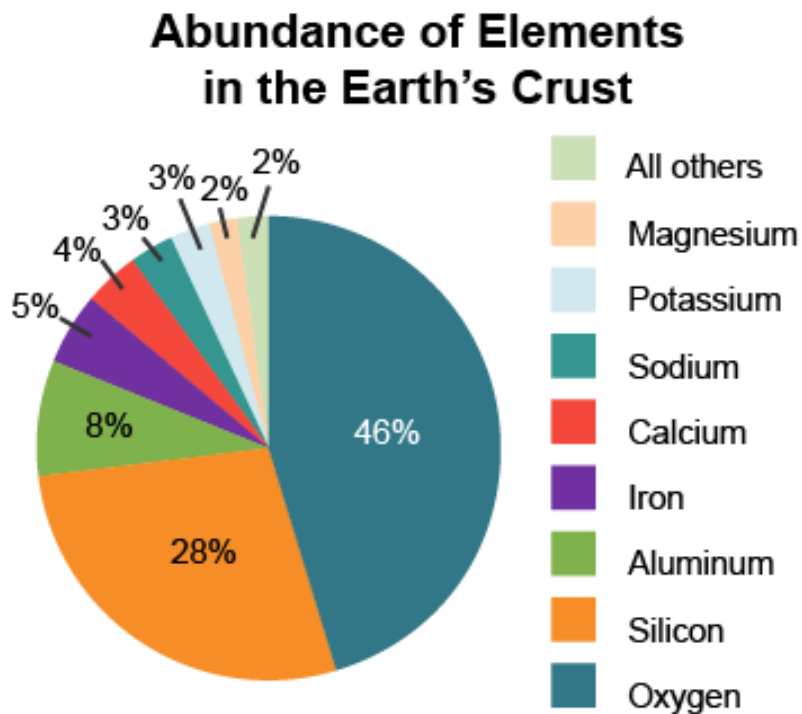
- This graph compares the density of different metals. The higher the bar, the more dense the metal.

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Pie Graphs

graphs show the relationship among .



- In this pie graph, the color of each “slice” relates to an element in Earth’s crust. Using the pie graph, it is easy to see that oxygen is the most abundant element in Earth’s crust.

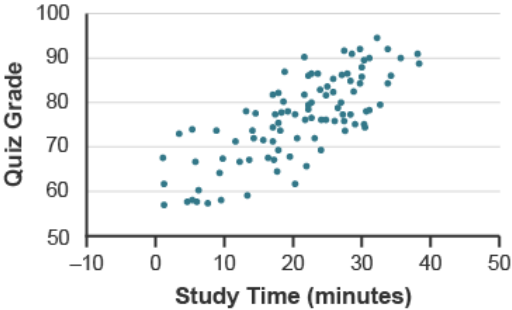
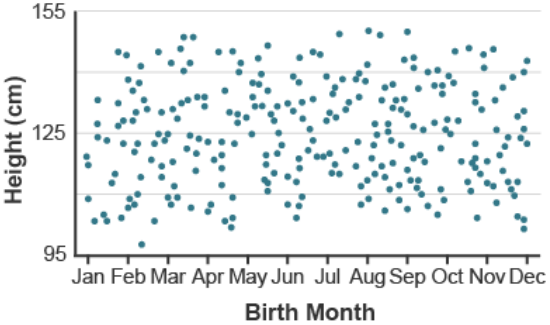
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Scatterplots

show the between two sets of data.

<p>Association between Study Time and Quiz Grade</p> 	<p>Boys' Height vs. Birth Month (simulated data)</p> 
<p>This scatterplot shows a direct relationship between time spent studying and quiz grade.</p>	<p>This scatterplot shows that there is no relationship between boys' height and birth month.</p>

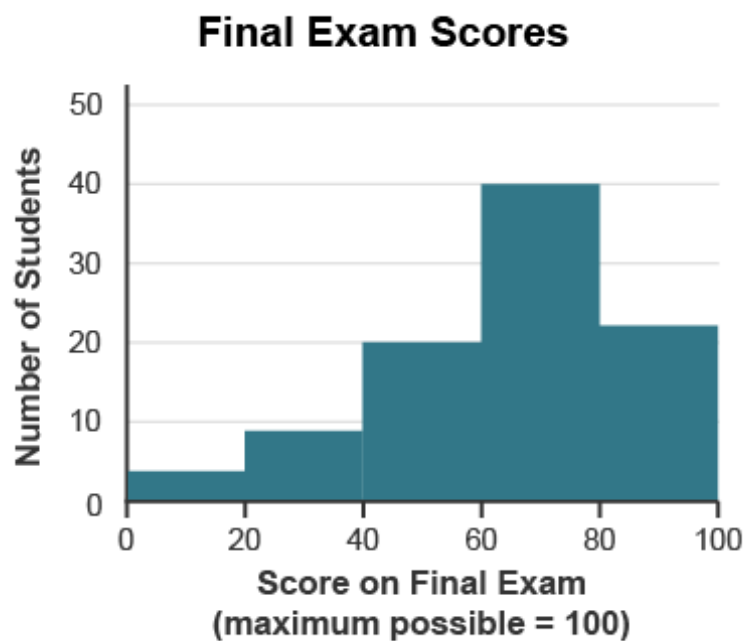
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Histograms

represent the of data.

- Groups numbers into



- This graph shows the final exam scores of students in a physical science class. Each bar represents a score range, such as 0–20%, 20–40%, and so on. About 20 students scored between 40–60% on the final exam. Most students (about 40) scored between 60–80%.

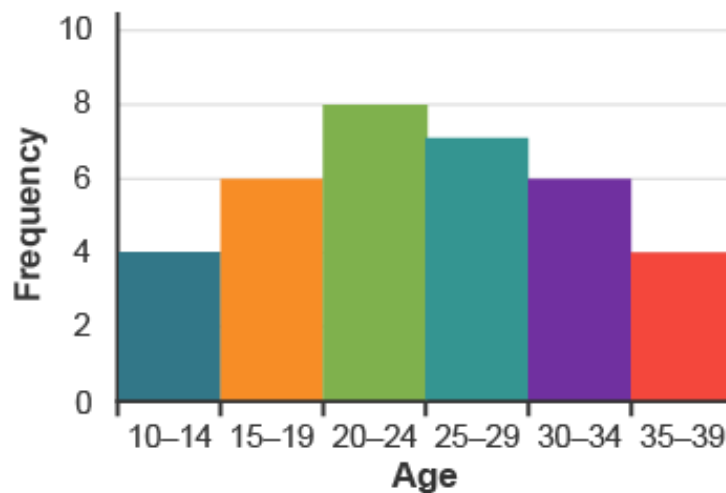
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Frequency Distributions

group data into and show how often occurs. Both the table and the histogram show the same frequency distribution.

Age	Frequency
10–14	4
15–19	6
20–24	8
25–29	7
30–34	6
35–39	4

Cell Phone Ownership

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Probability

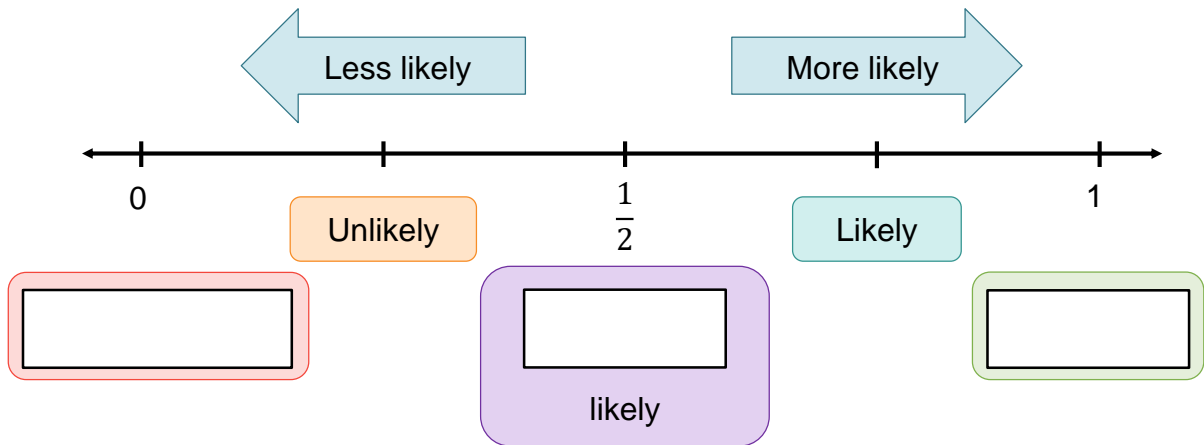
is the that a given event will occur.

$$\text{Probability} = \frac{\text{Number of } \boxed{\text{ }} \text{ outcomes}}{\boxed{\text{ }} \text{ number of outcomes}}$$

Because a coin has two sides—heads and tails—the probability of getting tails when flipping a coin is $\frac{1}{2}$.

Probability: Number Line

Probabilities have a value between 0 and 1.



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Probability: Example**GUMBALL MACHINE**

- What is the probability of getting a yellow gumball?

$$\frac{\text{Number of desired outcomes}}{\text{Total number of outcomes}}$$

Step 1: Count the number of yellow gumballs in the machine: .

Step 2: Count the total number of gumballs in the machine: .

Step 3: Solve using the probability equation: .

Step 4: Analyze the likelihood of getting a yellow gumball: Since $\frac{1}{10}$ is between 0 and $\frac{1}{2}$, it is unlikely that you will get a yellow gumball.



Summary

Analyzing Data

**Lesson
Question**

Why are data analyzed?

**Answer**

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2**Review: Key Concepts****VALID AND INVALID DATA**

- Valid data can be verified and by the researcher and other scientists.
- data may result from inadequate data, false data, measurement or recording , or the inability to reproduce data.

Summary

Analyzing Data

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Review: Key Concepts**GRAPHS**

Graphs are visual representations that display data in a variety of ways.

- **Line graphs** show .
- **Bar graphs** for particular categories.
- **Pie graphs** show the relationship among of .
- **Scatterplots** show the relationship between two sets of data.
- **Histograms** represent the of data.
- **Frequency distributions** data into and show how often a particular value occurs.

Review: Key Concepts**PROBABILITY**

is the that an event will occur.

- Probability = $\frac{\text{Number of desired outcomes}}{\text{Total number of outcomes}}$
- Values between 0 and 1
 - 0 = impossible
 - $\frac{1}{2}$ = equally likely
 - 1 = certain



Summary

Analyzing Data

Use this space to write any questions or thoughts about this lesson.