Edgenuity®

Warm-Up | Analyzing Data

? Lesson Question — Why are data analyzed?

Lesson Goals

Analyze data to determine their validity and reliability.

Predict trends in data from charts and graphs.

Examine data to draw inferences 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, descriptive data
quantitative data	a type of numerical data that can be measured

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Experimental Design Principles

- Different ⟨scientific designs⟩ follow a similar method.

- Good design and repeatability ensure ⟨valid⟩ results.

  - Repetition ⟨reduces mistakes⟩ and increases confidence in the results.

  - Replication should produce the ⟨same results⟩.

- Data must be reliable and ⟨consistent⟩.

  - ⟨Accuracy⟩ is the closeness of measured values to the accepted value.

  - Precision is the closeness of ⟨measured values⟩ to other measured values.

  - Reproducibility is the ability of data to be ⟨duplicated⟩.

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Valid vs. Invalid Data

- Valid data can be [verified] and reproduced by the researcher and other scientists.

- [Invalid] data may result from:

  - [inadequate] data.

  - [false] data.

  - measurement or recording [errors] .

  - the [inability] to reproduce data.

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Data Analysis

- [Qualitative] data can be [observed] but not measured.

- [Quantitative] data are [numerical] data that can be [measured] .

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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.

__A__ nonlinear

__C__ probability

__E__ graph

__B__ linear

__D__ analyze

A. not forming a straight line

B. forming a straight line

C. the likelihood that a given event will occur

D. to examine in detail

E. a visual representation of data

Data Analysis

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

Collect **data** . → **Analyze** data. → Draw **conclusions** .

Organize data.
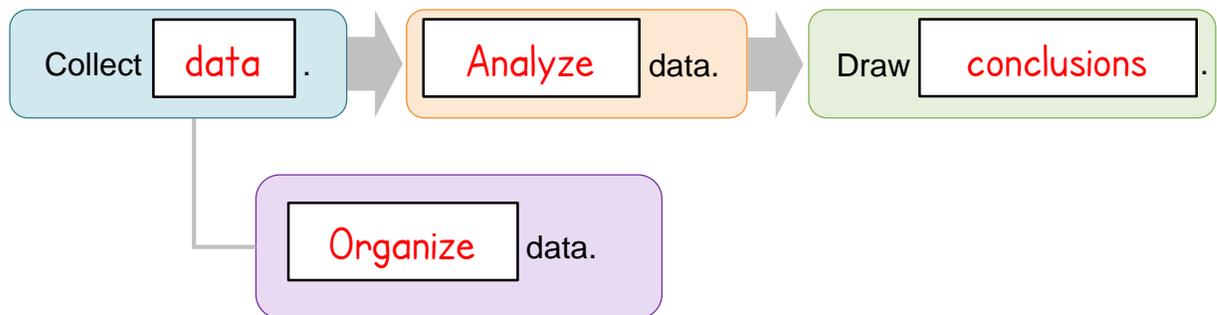
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Types of Graphs

A [graph] is a visual representation of data.

- [Communicates] complicated facts
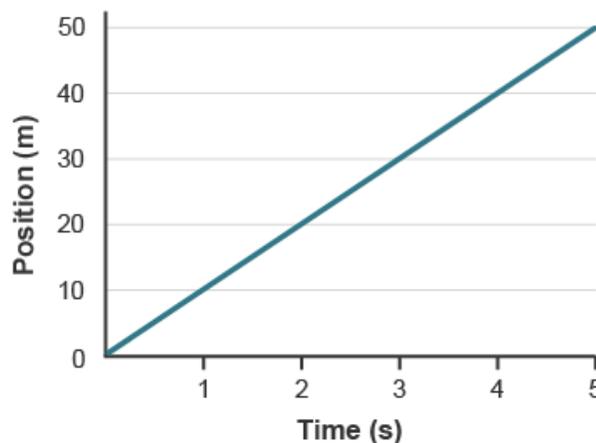- [Displays data] in a variety of ways

Line Graphs

[Line] graphs show changes over a period of time.

- The x-axis displays [time period].

- The y-axis shows what is being [measured].

They may be [linear] or [nonlinear].

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.
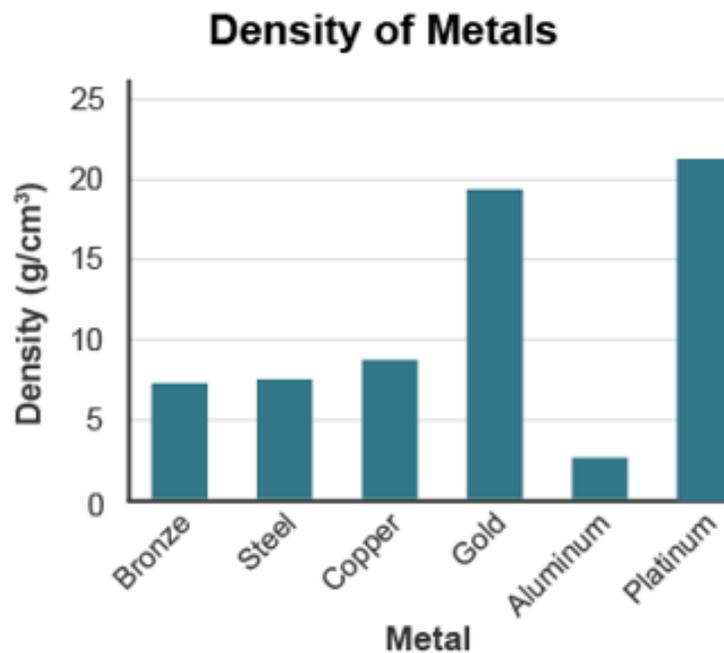
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Bar Graphs

Bar graphs **compare** quantities for particular categories.

- Used to see **relationships** quickly

Density of Metals

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

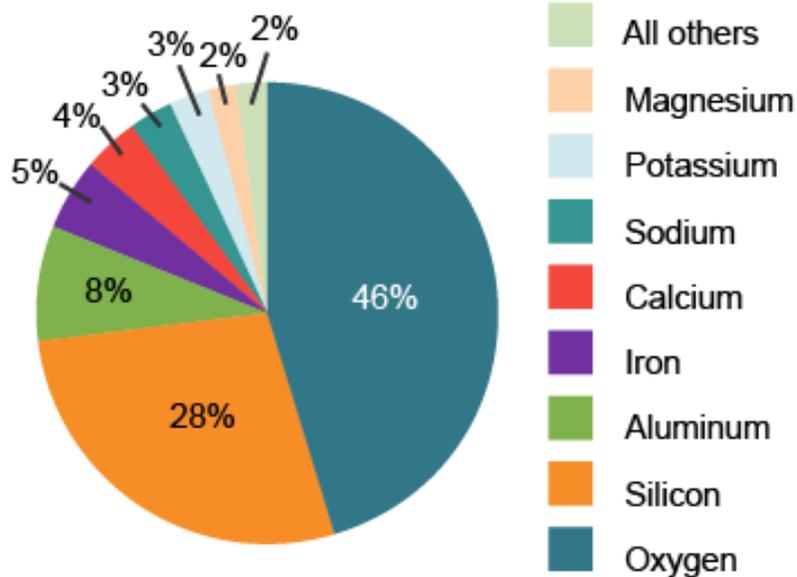**Instruction** | Analyzing Data

Pie Graphs

Pie graphs show the relationship among parts of a whole .

Abundance of Elements in the Earth's Crust

- 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.

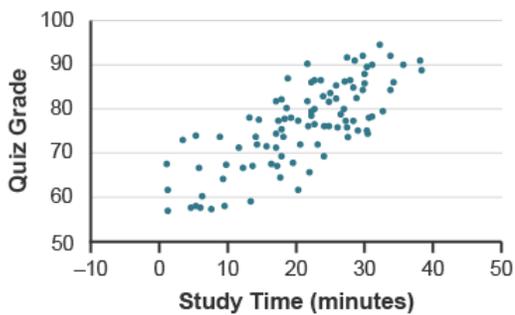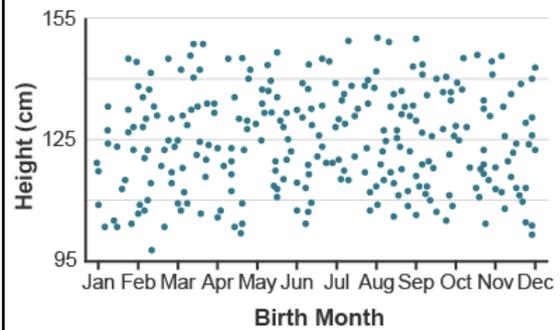**Scatterplots**

| Scatterplots | show the | relationship | between two sets of data. |

This scatterplot shows a direct relationship between time spent studying and quiz grade.

This scatterplot shows that there is no relationship between boys' height and birth month.

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Histograms

| Histograms | represent the | distribution | of data. |

- Groups numbers into | ranges |
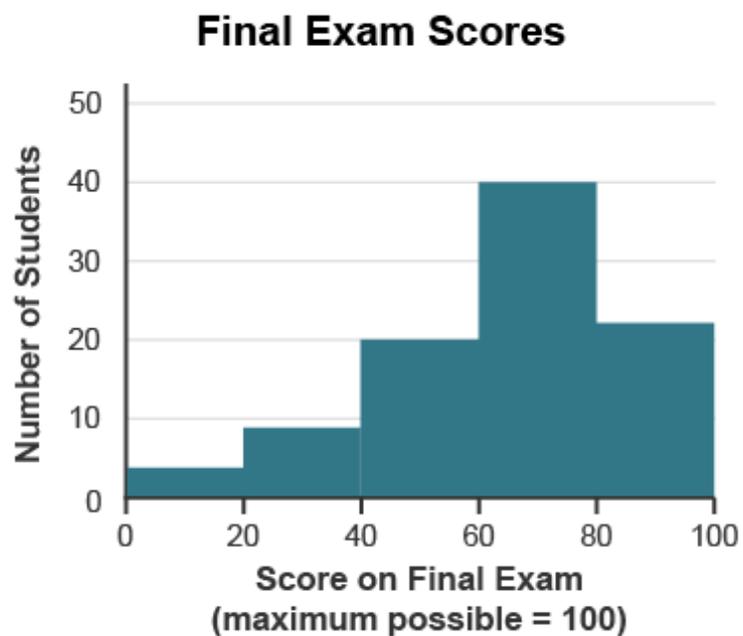
Final Exam Scores

- This graph shows the final exam scores of students in in a physical science class. Each bar represents a score range, such 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%.
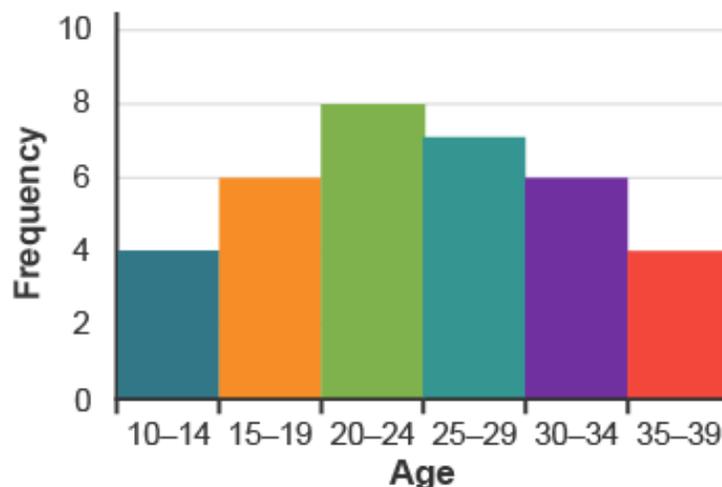
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Frequency Distributions

Frequency distributions group data into categories and

show how often a particular value 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
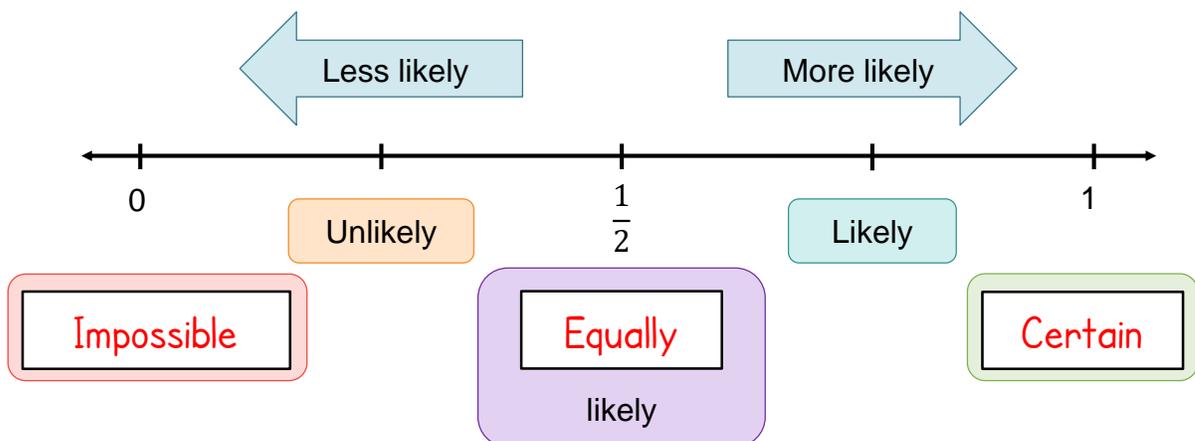
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Probability

| Probability | is the | likelihood | that a given event will occur.

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

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.

Less likely — More likely

0 — Unlikely — $\frac{1}{2}$ — Likely — 1

Impossible — Equally likely — Certain

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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: $\boxed{1}$.

Step 2: Count the total number of gumballs in the machine: $\boxed{10}$.

Step 3: Solve using the probability equation: $\boxed{\dfrac{1}{10}}$.

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

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Lesson Question	Why are data analyzed?

✓

Answer

(Sample answer) Data are analyzed to determine their validity and reliability, predict trends, draw inferences, and formulate conclusions.

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Review: Key Concepts

VALID AND INVALID DATA

- Valid data can be verified and reproduced by the researcher and other scientists.

- Invalid data may result from inadequate data, false data, measurement or recording errors, or the inability to reproduce data.

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Review: Key Concepts

GRAPHS

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

- **Line graphs** show | changes over time | .

- **Bar graphs** | compare quantities | for particular categories.

- **Pie graphs** show the relationship among | parts | of | a whole | .

- **Scatterplots** show the relationship between two sets of data.

- **Histograms** represent the | distribution | of data.

- **Frequency distributions** | group | data into | categories | and

  show how often a particular value occurs.

Review: Key Concepts

PROBABILITY

| Probability | is the | likelihood | that an event will occur.

- Probability = $\dfrac{\text{Number of desired outcomes}}{\text{Total number of outcomes}}$

- 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.