

## AP Statistics • Unit 2, Lesson 4 (Video 1)

### Sentence-Frame Concept Worksheet

Distinguishing Explanatory & Response Variables & Constructing Scatter Plots

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Class/Period: \_\_\_\_\_

#### Learning Objectives (00:13-00:25)

As you watch the video, complete these learning objectives:

1. For bivariate data, I will learn how to determine which variable is the \_\_\_\_\_ variable.
2. I will learn how to determine which variable is the \_\_\_\_\_ variable.
3. I will learn how to construct a \_\_\_\_\_.

#### Context: The Income Achievement Gap (00:31-01:21)

##### The National Trend:

In the United States, \_\_\_\_\_ and \_\_\_\_\_ income students tend to perform better on math exams than \_\_\_\_\_ income students on average. This is called the \_\_\_\_\_.

##### Critical Understanding (01:01-01:19):

- This data says **nothing** about \_\_\_\_\_ performance.
- It's merely a trend of \_\_\_\_\_ for full groups.
- This data says **nothing** about \_\_\_\_\_ intelligence.

#### Possible Factors Behind the Gap (01:26-02:28)

##### Factor 1: Wealth Privilege (01:26)

Middle and upper income students often don't face as many educational \_\_\_\_\_ as their lower income peers.

##### Factor 2: Income Attendance Gap (01:53-02:15)

Higher income areas tend to have \_\_\_\_\_ chronically absent students.

Potential reasons for this attendance gap:

- Better \_\_\_\_\_ access for higher income students
- Less need to \_\_\_\_\_ to support family, allowing more school attendance

##### The Proposed Solution (02:28-02:47):

Some school systems have targeted \_\_\_\_\_ as the key to raise test scores for lower income students.

## Today's Research Question (02:51-03:05)

Is the statement “\_\_\_\_\_” reasonable or is it BS?

*Note: BS stands for \_\_\_\_\_*

## The Data (03:08-03:22)

**Sample Information:**

- Sample size:  $n =$  \_\_\_\_\_ students (random sample)
- Variable 1: Percent of \_\_\_\_\_ each student attended
- Variable 2: Number of \_\_\_\_\_ answered correctly on the Texas end-of-year \_\_\_\_\_ assessment

## Identifying Variable Types (03:31-03:58)

**Complete the classification:**

Variable	Type (Explanatory/Response)	Symbol (X or Y)	Why this classification?
Attendance (%)	_____	_____	We think it might _____ student performance
Questions Correct	_____	_____	We think it _____ to attendance

**Memory Tip:** The eXplanatory variable goes on the \_\_\_\_\_-axis!

## Choosing the Right Visualization (04:14-04:36)

**Decision Tree:**

1. How many variables are being measured? \_\_\_\_\_
2. What type of variables are they?
  - ☐ Categorical (groups/categories)
  - ☐ Quantitative (numerical with inherent order)
3. Why are they this type? Each variable is \_\_\_\_\_ with an inherent \_\_\_\_\_ to it.

**Conclusion:** When we have **two** \_\_\_\_\_ variables, we should make a \_\_\_\_\_.

**CRITICAL:** Components of a Quality Scatter Plot (04:54-05:11)

When creating a scatter plot for the AP exam, you **MUST** include:

1. A descriptive \_\_\_\_\_ that includes the \_\_\_\_\_
2. Labeled \_\_\_\_\_ showing:
  - Which variable is \_\_\_\_\_ (x-axis)
  - Which variable is \_\_\_\_\_ (y-axis)
  - Include \_\_\_\_\_ when applicable
3. Properly shown \_\_\_\_\_ with \_\_\_\_\_ marks to prevent misleading graphs

**Practice:** Create Your Scatter Plot (04:36-05:11)

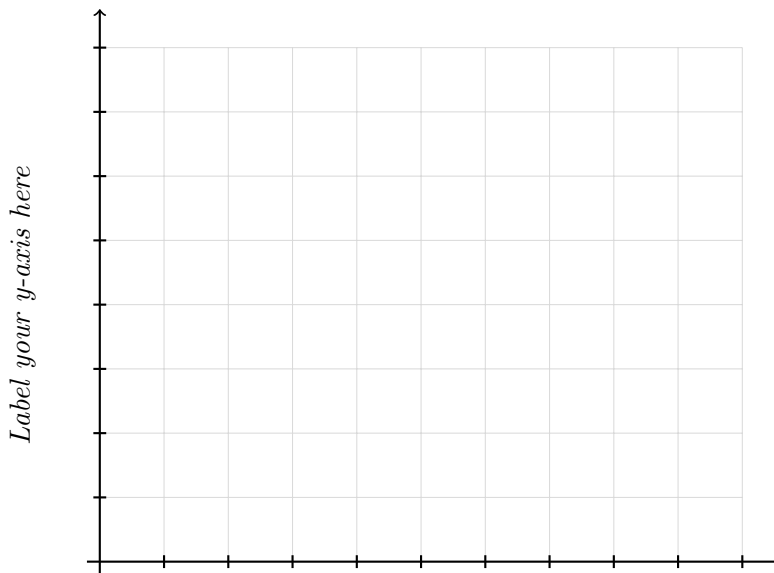
**Title:** \_\_\_\_\_

**Axis Labels:**

X-axis (explanatory): \_\_\_\_\_ Units: \_\_\_\_\_

Y-axis (response): \_\_\_\_\_ Units: \_\_\_\_\_

*Add your descriptive title here*



*Label your x-axis here with variable and units*

*Remember: Each individual is plotted as a point with coordinates  $(x, y) = (\text{attendance}\%, \text{questions correct})$*

## Looking Ahead: Describing Trends (05:14-05:27)

**Next Video Preview:** How would you describe the \_\_\_\_\_ you see in the scatter plot?

Think about:

- Direction: Is the association \_\_\_\_\_ or \_\_\_\_\_?
- Form: Is the pattern \_\_\_\_\_ or \_\_\_\_\_?
- Strength: Is the relationship \_\_\_\_\_, \_\_\_\_\_, or \_\_\_\_\_?
- Unusual features: Are there any \_\_\_\_\_ or \_\_\_\_\_?

## Key Takeaways (05:30-05:47)

1. \_\_\_\_\_ variables predict or explain trends in \_\_\_\_\_ variables.
2. Scatter plots visualize trends between \_\_\_\_\_ variables.
3. When making a scatter plot, always include:
  - A \_\_\_\_\_
  - Labeled \_\_\_\_\_ (with \_\_\_\_\_ if applicable)
  - Properly shown \_\_\_\_\_ with \_\_\_\_\_ marks

## The Statistician's Mindset (05:50-05:59)

When analyzing data, statisticians should be:

\_\_\_\_\_

And always avoid “\_\_\_\_\_” which stands for \_\_\_\_\_!

## Critical Thinking Questions

1. Why is it important that the data about test scores reflects *averages* and not individual performance? How might this distinction affect policy decisions?
2. In your own words, explain the difference between an explanatory variable and a response

variable. Give an example from your own life.

3. The video suggests that targeting attendance might not be the complete solution to the achievement gap. What other factors might need to be considered? Why is it dangerous to assume a simple cause-and-effect relationship?
4. What could be misleading about a scatter plot if we didn't include proper scales with tick marks?

#### Exit Ticket - Check Your Understanding

**Scenario:** A researcher wants to study if hours of sleep affects test scores.

1. Which variable is explanatory? \_\_\_\_\_ Which is response?  
\_\_\_\_\_
2. Justify your answer: \_\_\_\_\_
3. What type of graph would be appropriate? \_\_\_\_\_ Why?  
\_\_\_\_\_
4. List the three essential components your graph would need:
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_

*Tip: Use the timestamps to pause and fill in details as the video progresses. The video is approximately 6 minutes long.*