

Supporting STAAR™ Achievement: Targeting the TEKS and Readiness

Standards

Algebra I

Teacher Edition

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What Is *Supporting STAAR™ Achievement: Targeting the TEKS and Readiness Standards*?

1

A resource that focuses on the TEKS identified as readiness standards while integrating appropriate supporting standards and mathematical processes and skills

2

A resource that provides opportunities for rigorous mathematical conversations while providing supports for students at varying levels of readiness

3

A resource that provides support for English language learners and students struggling to learn mathematics through Tier I differentiated activities, preteaching experiences, scaffolds for activities such as hint cards and graphic organizers, and facilitation questions

4

A resource that supports beginning as well as experienced teachers through clear instructions and facilitation questions that focus on potential stumbling blocks for students in the effort to bridge to formal understanding of mathematics

5

A resource of classroom-ready 5E lessons. The Engage phase of each lesson consists of a student-centered activity that either bridges from students' prior knowledge or encourages interest in deeper exploration of the concepts in the lesson. The Explore phase of each lesson provides students with an opportunity to "do mathematics" and begin to formulate ideas and conjectures. In the Explain phase of each lesson, students formalize the mathematical ideas from the Explore phase with a focus on academic vocabulary, as well as procedures related to the concepts. The Elaborate phase of each lesson allows students to apply or extend their understanding of the concepts in the lesson. The Evaluate phase consists of four selected-response or griddable items that can be used to assess student understanding.

What Is in a Lesson Found in *Supporting STAAR™ Achievement: Targeting the TEKS and Readiness Standards?*

Each readiness standard has been rewritten in student-friendly language so that students may gauge their learning.

Additional TEKS that support the conceptual and procedural development of the readiness standard within this lesson are identified.

Linear Inequalities

Linear Inequalities

Readiness Standard

A.7B The student is expected to investigate methods for solving linear equations and inequalities using concrete models, graphs, and the properties of equality, select a method, and solve the equations and inequalities.

Content Objectives

I can find the solutions to linear inequalities using graphs and algebraic methods.

Additional TEKS

A.7C The student is expected to interpret and determine the reasonableness of solutions to linear equations and inequalities.

ELPS

c3D The student is expected to speak using grade-level content area vocabulary in context to internalize new English words and build academic language proficiency.

Language Objective

I can describe inequalities using words and symbols.

Additional ELPS

- c5B** The student is expected to write using newly acquired basic vocabulary and content-based grade-level vocabulary.
- c5G** The student is expected to narrate, describe, and explain with increasing specificity and detail to fulfill content area writing needs as more English is acquired.

Prerequisite Knowledge

- Locate points on the coordinate plane
- Determine if a point is a solution of an inequality
- Solve one-variable inequalities
- Graph solution sets (inequalities) on a number line
- Transform an equation in standard form to slope-intercept form
- Graph an equation in two variables

Vocabulary Focus

Coefficient
Greater Than, $>$
Greater Than or Equal To, $\geq$
Inequality
Less Than, $<$
Less Than or Equal To, $\leq$
Solution
Solution Set

Each lesson includes an English Language Proficiency Standard rewritten in student-friendly language.

Each lesson includes prerequisite knowledge that may impact student success within the lesson as well as vocabulary that will be used during the lesson.

Supporting STAAR™ Achievement: Algebra I

What Is in a Lesson Found in *Supporting STAAR™ Achievement: Targeting the TEKS and Readiness Standards?*

Materials for each phase are summarized on one page for ease in preparation.

Grouping strategies for each phase are summarized to assist in the arrangement of the classroom.

Linear Inequalities

Notes

- Provide a graphing calculator for each student to use throughout the lesson.
- Read and select facilitation questions as appropriate to meet your students' needs.

	Materials	Instructional Grouping
Preteach	One-Variable Inequalities	Small group with teacher facilitation

Phase	Materials <i>one per student unless otherwise noted</i>	Instructional Grouping
Engage	- Spin and Compare - Number Lines* - Paper clip	Independent
Explore	- Greater Than or Less Than - Greater Than or Less Than* - Straightedge - Highlighter	Pairs of students
Explain	- Inequality Notes Page - Inequality Notes Page (for display) - Straightedge - Colored pencils (blue, green, and yellow)	Whole-group discussion
Elaborate	- Matching Inequalities - Matching Inequalities Cards - Scissors - Tape or glue	Individual
	Intervention - Matching Inequalities* - Matching Inequalities Cards* - Scissors - Tape or glue	Small group with teacher facilitation
Evaluate	Evaluate: Linear Inequalities	Individual

*for targeted students only

The Elaborate phase has two concurrent components: a student-facilitated activity and a teacher-facilitated activity that focuses on the needs of students struggling with the content.

Materials that are provided as supports for students in need of additional help are labeled with an asterisk.

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Supporting STAAR

What Is in a Lesson Found in *Supporting STAAR™ Achievement: Targeting the TEKS and Readiness Standards?*

Each lesson includes a preteach activity that teachers may use with students who might benefit from exposure to related concepts prior to the lesson.

Linear Inequalities

Preteach

1. Distribute **One-Variable Inequalities** to each student. Work Problem A as a think-aloud with students.
2. State, "The first step in solving the inequality $3x - 9 \leq 18$ is to isolate the variable." Circle the variable x in the inequality.
3. Ask, "What is the first step in isolating the variable?" Listen for students understanding to add 9 to both sides of the inequality. Record the first step.
4. Ask, "What is the next step in solving the inequality?" Listen for student understanding to divide both sides by 3. Record the second step.
5. Ask, "Do I need to change the inequality symbol to a greater than or equal to symbol?" Listen for students to identify that the inequality sign is only changed when multiplying or dividing both sides of the inequality by a negative number.
6. Ask, "Where do we place the endpoint to graph our solution of $x \leq 9$?" Point to 9 on the number line.
7. Ask, "Should the endpoint be an open circle or a closed circle? Why?" Listen for students to identify the need for a closed circle because the solution set includes nine. Draw a closed circle at 9.
8. Ask, "How could we verify that we shaded in the correct direction?" Listen for students to suggest selecting a point on the shaded portion of the number line and substituting the value into the original inequality to verify that it is a solution.
9. Ask, "Which direction should we shade the number line? Why?" Listen for students to describe shading to the left because the values that are less than nine are to the left.
10. Prompt students to verbalize a process that could be used to solve Problem B. As students describe the process, prompt them to record their work.
11. Prompt students to verbalize a process that could be used to graph the solutions for the inequality in Problem B. As students describe the process, prompt them to complete the graph.
12. If students demonstrate continued need for support, guide students through Problem B. If students appear ready to work with a partner or independently, allow the students to do so.
13. Upon completion, debrief the three questions at the bottom of the page.

Engage

1. Distribute **Spin and Compare** and a paper clip to each student.
2. Prompt students to work independently to complete the activity.
3. Upon completion, debrief with the following questions:
 - How did you determine which inequality sign to circle?
 - How would you read each comparison?

Supports

Provide students with **Number Lines*** to use when comparing values. Prompt students to graph both values on the same number line. Have students examine the number line to see that as you look from left

Facilitation Questions

- What value are you comparing to the value of the expression?
- How could you compare two negative numbers to determine which number is larger?

Listen for . . .

- Use of placement along a number line or real world example to determine which value is greater

Each phase includes directions to implement the activity and the identification of additional student supports for the activity.

Each phase includes facilitation questions to help students who may be struggling to interpret or process components of the activity.

What Is in a Lesson Found in *Supporting STAAR™ Achievement: Targeting the TEKS and Readiness Standards?*

Titles of activity masters and student pages are printed in bold for ease of reference.

Solving Linear Inequalities

- the points on that side of the line will satisfy the inequality.
11. Prompt student to complete the *Where to Shade?* box on the graphic organizer.
 12. Repeat the process for the second inequality on **Inequalities Notes Page**.
 13. Debrief using the following questions:
 - How are the graphs similar? Why?
 - How are the graphs different? Why?
 - How do you know when to use a solid line vs. when to use a dashed line for your graph? Listen for an understanding that a dashed line is used for inequalities that have $<$ or $>$, and that a solid line is used for inequalities that have $\leq$ or $\geq$ because these include the points that are on the line as a part of the solution set.
 14. Ask, "How do you determine where to shade the graph?" Listen for an understanding that test points above and below the line can be used to determine where to shade the graph. Shade the region of the graph where the test points make the inequality a true statement.

★ Elaborate

1. Distribute **Matching Inequalities**, **Matching Inequalities Cards**, scissors, and tape or glue to each student.
2. Prompt students to work independently to complete the activity.
3. If a student appears to be struggling with **Matching Inequalities**, the student may refer to **Inequalities Notes Page** or join the teacher-led intervention group.

Intervention

1. Distribute **Matching Inequalities***, **Matching Inequalities Cards***, scissors, and tape or glue to each student.
2. Prompt students to cut apart the **Matching Inequalities Cards***.
3. Direct students' attention to the inequality that is given in the first problem, $3x + 2y \leq 6$.
4. Prompt students to share what information is given in the first problem. Guide students to solve the inequality for y .
5. Ask, "Describe the graph of the related line." Listen for a solid line that passes through the point $(0, 6)$ and has a rise of negative three and a run of two.
6. Prompt students to find and attach the graph card representing the given inequality.
 - How do you know that the graph you selected represents the given inequality?
7. Prompt students to select, mark, and test a point above and a point below the line.
8. Ask, "Based on your test points which region of the graph should be shaded?"
9. Prompt student to shade the correct region of the graph.
10. If students demonstrate continued need for support, guide them through the next problem. If students appear ready to work with a partner or independently, allow the students to do so.

The Tier I intervention provides instructions on how to make the mathematics content more explicit for students struggling with the concepts within the lesson. The activity is at the same rigor as the activity being completed by the students in a self-directed environment.

What Is in a Lesson Found in *Supporting STAAR™ Achievement: Targeting the TEKS and Readiness Standards?*

Linear Inequalities

Evaluate

Question Number	Correct Answer	Reporting Category	TEKS	Conceptual Error			Procedural Error			Guess
1	A	4	A.7B	B	C	D				
2	C	4	A.7B	A	B		D			
3	B	4	A.7B	A	C	D				
4	D	4	A.7B	A	B	C				

Each selected-response item is labeled with the STAAR™ reporting category and student expectation. Incorrect answer choices are classified according to type.

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Supporting STAAR™ Achievement: Algebra I

Making Predictions from Scatterplots

Readiness Standard

A.2D The student is expected to collect and organize data, make and interpret scatterplots (including recognizing positive, negative, or no correlation for data approximating linear situations), and model, predict, and make decisions and critical judgments in problem situations.

Content Objectives

I can make predictions using scatterplots.

Additional TEKS

- A.4A The student is expected to find specific function values, simplify polynomial expressions, transform and solve equations, and factor as necessary in problem situations.
- A.6D The student is expected to graph and write equations of lines given characteristics such as two points, a point and a slope, or a slope and y-intercept.

ELPS

c3D The student is expected to speak using grade-level content area vocabulary in context to internalize new English words and build academic language proficiency.

Language Objective

I can write and speak using the terms positive correlation, negative correlation, no correlation, and trend line.

Additional ELPS

- c5B The student is expected to write using newly acquired basic vocabulary and content-based grade-level vocabulary.
- c5G The student is expected to narrate, describe, and explain with increasing specificity and detail to fulfill content area writing needs as more English is acquired.

Prerequisite Knowledge

- Identify positive, negative, or no trend from scatterplots
- Determine the slope of a line when given the coordinates of two points on the line
- Determine the equation of a line given a graph or two points on the line

Vocabulary Focus

Correlation
Domain
Range
Scatterplot
Trend Line

Notes

- Provide a graphing calculator and straightedge for each student to use throughout the lesson.
- Read and select facilitation questions as appropriate to meet your students' needs.

Preteach	Materials	Instructional Grouping
	◆ Scatterplots ◆ Scatterplot Sort ◆ Drawing a Trend Line Hints* (optional) ◆ Scissors ◆ Tape	Small group with teacher facilitation

Phase	Materials <i>one per student unless otherwise noted</i>	Instructional Grouping
Engage	◆ Tongue Tied ◆ Number Cards (one card per pair) ◆ Stopwatch	Pairs of students
Explore	◆ Tongue Twister Trend Line ◆ Analyzing the Results ◆ Drawing a Trend Line Hints* ◆ Linguine noodles (two per student) ◆ Straightedge	Pairs of students
Explain	◆ Making Predictions from Scatterplots Notes Page ◆ Straightedge	Whole-group discussion
Elaborate	◆ Coffee Shop Sales ◆ Straightedge	Individual
	Intervention ◆ Coffee Shop Sales* ◆ Linguine noodles (two per student) ◆ Straightedge	Small group with teacher facilitation
Evaluate	◆ Evaluate: Scatterplots ◆ Straightedge	Individual

* for targeted students only



Preteach

1. Distribute **Scatterplots** to each student.
2. Ask, "What is a scatterplot?" Listen for students describing a graph of two sets of data as ordered pairs used to identify trends.
3. Prompt students to record their definition of scatterplots on the graphic organizer on **Scatterplots**.
4. Ask, "What are scatterplots used for?" Listen for students stating that scatterplots are used to look for relationships or trends between two sets of data.
5. Prompt students to record their response on the graphic organizer.
6. Distribute **Scatterplot Sort**, scissors, and tape to each student. Prompt students to cut apart the cards on **Scatterplot Sort**.
7. Prompt students to sort the scatterplots into two or three categories.
8. Prompt students to describe how they sorted the scatterplots.
9. Ask, "How are scatterplots typically read?" Listen for students to describe that graphs are typically read from left to right.
10. Ask, "As you read each scatterplot from left to right, how would you describe how the points are arranged?" Listen for student understanding that as graphs are read from left to right the points could be increasing, decreasing or show no relation.
11. Ask, "What are these patterns called?" Listen for students to name the patterns as trends.
12. If students have not sorted the cards according to their trend, then prompt the students to sort the cards into a group where the trend is increasing, decreasing, or neither.
13. Prompt students to attach the cards from the **Scatterplot Sort** that are increasing in the positive trend category. Listen for student understanding that when the points are increasing when read from left to right, the correlation is positive.
14. Repeat for negative correlation and no correlation. Listen for connections between the trend of the points and the correlation.

*Note: During the Explore phase of the lesson, students will write the equation of a line when given two points on the line. If this process needs to be reinforced for some students, consider sketching a line on a grid and using **Drawing a Trend Line Hints*** to review necessary skills.*



Engage

1. Cut out the **Number Cards** and place them in a cup or bag and prompt students to draw a number. This number will be how many times they are to repeat the tongue twister.
2. Display **Tongue Tied**. Note any tongue twister may be used.
3. Prompt student pairs to decide who will manage the time and who will say the tongue twister.
4. Have students write down the number of times they repeated the tongue twister and the amount of time it took. You will collect this information in the next phase of the lesson.



Explore

1. Distribute two linguine noodles, a straightedge, **Tongue Twister Trend Line**, and **Analyzing the Results** to each student.
2. Create a list of the class data for display. Prompt each pair of students to add their data to the list.
3. Prompt students to use the class data to complete **Tongue Twister Trend Line**.
4. Upon completion, debrief with the following questions:
 - *How would you describe this data?*
 - *How did you determine the slope of the equation for the trend line?*
 - *How did you determine the y-intercept of the equation for the trend line?*
 - *How many data points are above your trend line? How many are below? How do they compare?* Listen for students to notice that the number of data points above the trend line is about the same as the number of data points below the trend line.
 - *Is there more than one reasonable trend line for a set of data? Why or why not?* Listen for students to describe that there are many reasonable trend lines that could be drawn, but the lines should be fairly close to each other.

Facilitation Questions

- **What does x correspond to in this situation? How do you know?**
- **What does y correspond to in this situation? How do you know?**
- **What do you estimate the y-intercept to be? Why?**
- **Do you expect the slope to be positive or negative? Why?**
- **Should 25 be substituted into the equation for x or y ? Why?**

Listen for . . .

- *Connections among the graph, equation, and scenario*
- *Student use of slope and y-intercept for determining the equation of the trend line*

Supports

Provide students with **Drawing a Trend Line Hints***.



Explain

1. Distribute **Making Predictions from Scatterplots Notes Page** to each student.
2. Prompt students to label each graph according to the type of trend or correlation shown, if any, and to draw a trend line for each graph.
3. Ask, "*How would you define correlation?*" Listen for student understanding that correlation describes the relationship between two sets of data and can be positive, negative, or neither.
4. Ask, "*What is a trend line?*" Listen for students to state that it is a line used to show the relationship between two sets of data and can be used to make predictions.
5. Ask, "*Will every data set have a trend line? Why or why not?*" Listen for students to state that data sets that have no correlation would not have a trend line.

6. Say, "When determining if there is a trend in the data, we are looking to see if there is a correlation, or relationship, between two sets of data." Note that finding a correlation between two sets of data does not imply causation.
7. Prompt students to complete the first boxes summarizing key points related to correlations and trend lines on the notes page.
8. Ask, "How did you determine which points on the trend line to use to determine the equation of the line?" Listen for students to select two points that are relatively easy to determine accurate values for.
9. Ask, "How did you make a prediction using the graph of the trend line?" Listen for students to describe finding the requested value on the appropriate axis and then determining the corresponding value on the other axis based upon the placement of the trend line.
10. Ask, "How did you make a prediction using an equation for the trend line?" Listen for students substituting the given value for the appropriate variable in the equation and solving for the other value.
11. Ask, "When would you use the graph of the trend line to make predictions?" Listen for students to describe using the graph if the value is shown on the graph or if there are just a few predictions needed.
12. Prompt students to record key points of the discussion related to using graphs in the appropriate box on the notes page.
13. Ask, "When would you use the equation of the trend line to make predictions?" Listen for students to recognize that the equation is helpful when being asked to make several predictions or in making a prediction for a value that is not on the graph.
14. Prompt students to record key points of the discussion related to using equations in the appropriate box on the notes page.

Elaborate

1. Distribute **Coffee Shop Sales** to each student and prompt students to complete the activity.
2. If a student appears to be struggling with **Coffee Shop Sales**, the student may complete **Coffee Shop Sales*** or join the teacher-led intervention group.

Intervention

1. Distribute **Coffee Shop Sales***. Allow students to use the linguine noodles or **Drawing a Trend Line Hints*** as needed throughout the activity.
2. Prompt students to silently read the problem.
3. Once students have preread the problem, read the problem aloud or have a student read the problem aloud.
4. Ask, "What data is being graphed?"
5. Ask, "Does there appear to be a correlation, or a linear relationship, between the two sets of data? If so, what type?" Listen for students to identify that there does appear to be a positive correlation between the two sets of data.
6. Ask, "What does the ordered pair (12, 8.5) represent?" Listen for students to state that in the 12th month, the store had a profit of \$8.5 thousand dollars.
7. Ask, "How else could \$8.5 thousand dollars be written?" Listen for \$8,500 as a response.
8. Work with this group of students to complete **Coffee Shop Sales***. Consider

asking students to make predictions for varying number of months or for various amounts of profit.

Note: Consider asking students to sketch trend lines on their papers and then select two points to use in determining the equation of the trend line.

Discussions may be easier to facilitate if the group agrees on the same two points to use for the purposes of determining an equation.

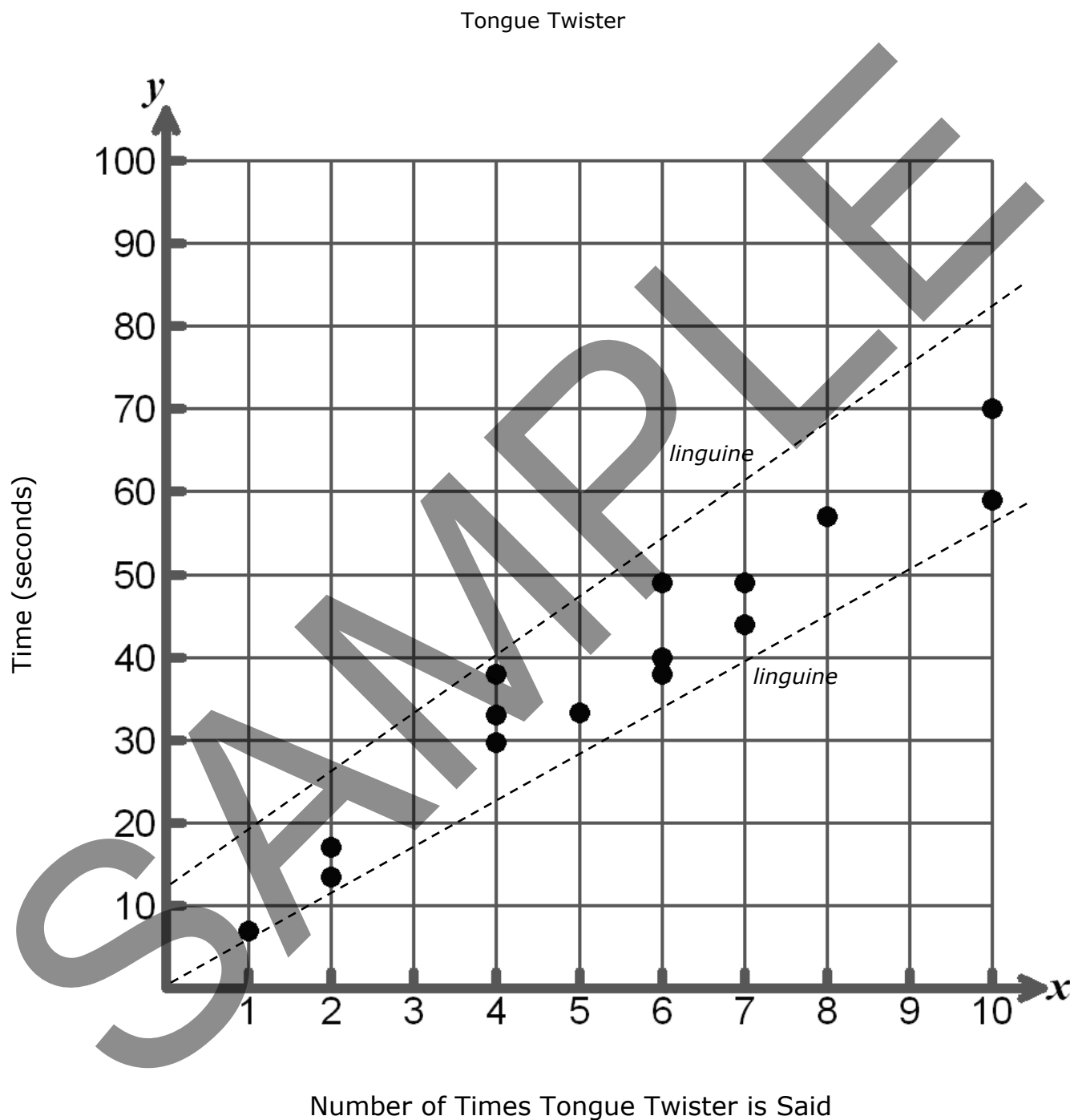


Evaluate

Question Number	Correct Answer	Reporting Category	TEKS	Conceptual Error			Procedural Error			Guess
1	C	2	A.2D	A	B	D				
2	A	2	A.2D	B	C	D				
3	B	2	A.2D	A	B					D
4	B	2	A.2D	A	C	D				

Tongue Twister Trend Line (Answer Key)

Use the data for the class to create a scatterplot for the tongue twister. Make sure to label and scale the axes.



Analyzing the Results (Answer Key)

Part 1

Use the graph you created to answer the following questions.

1. As the number of times the tongue twister was said increased, what happened to the total time?
The total time increased.
2. As the total time increased, what happened to the number of times the tongue twister was said?
The number of times the tongue twister was said increased.
3. Does there appear to be a relationship between the total time and number of times the tongue twister was said? If so, how would you describe the relationship?
Yes, it appears that as the number of times the tongue twister is said increases, the total time increases.
4. What type of trend, if any, is depicted by this scatterplot?
A positive trend is depicted.

Part 2

What if . . .

I want to make a reasonable prediction about the total time of any number of times the tongue twister is said.

Follow the directions below to draw a **trend line** to approximate the pattern. The trend line will help you make good predictions about the total time.

1. Use two pieces of linguine to enclose all of the points on your graph. Be sure to position your linguine as close to the outer points as possible. (You do not have to keep your linguine lines parallel.)
See dashed lines on graph for possible placement.
2. Use a ruler to draw a line that is halfway between your two linguine lines. This line is called the trend line.
See graph for possible trend line.
3. Use the trend line drawn to predict the total time for a person who said the tongue twister 7 times. What is your prediction? Why?
Possible response: If a person says the tongue twister 7 times, the total time might be 51 seconds. I used the trend line that I sketched to make my prediction.
4. Select two points on the line. Write the coordinates of the two points below.
Possible response: (1, 10) and (10, 70)

5. What is the slope of your trend line?

Possible response using the data points on Page 56: $\frac{63}{9}$ or 7

6. How are the slope of the trend line and the type of trend for this data related?

Both the slope and the trend are positive.

7. Write the equation of your trend line.

Possible response using the data points on Page 56: $y = 7x$

8. Using the equation you have written, predict the total time for a person to say the tongue twister 7 times. How does this value compare to the value determined from the graph?

Possible response using the equation above: The equation predicts the time to say the tongue twister 7 times is 49 seconds. This is very close to the value that was found using the graph.

9. Using the equation you have written, predict the total time for a person to say the tongue twister 25 times. Do you think that is reasonable? Why or why not?

Possible response using the equation above: The equation predicts that the time to say the tongue twister 25 times would be 175 seconds. I think this is probably not reasonable because the more you say the tongue twister, the more tired you get. You might start saying the tongue twister more slowly over time.

10. Using the equation you have written, predict the total time for a person to say the tongue twister 2 times. Do you think that is reasonable? Why or why not?

Possible response using the equation above: The equation predicts that the time to say the tongue twister 2 times is 14 seconds. This is reasonable because the time to say the tongue twister 2 times would be approximately double the amount of time to say it once.

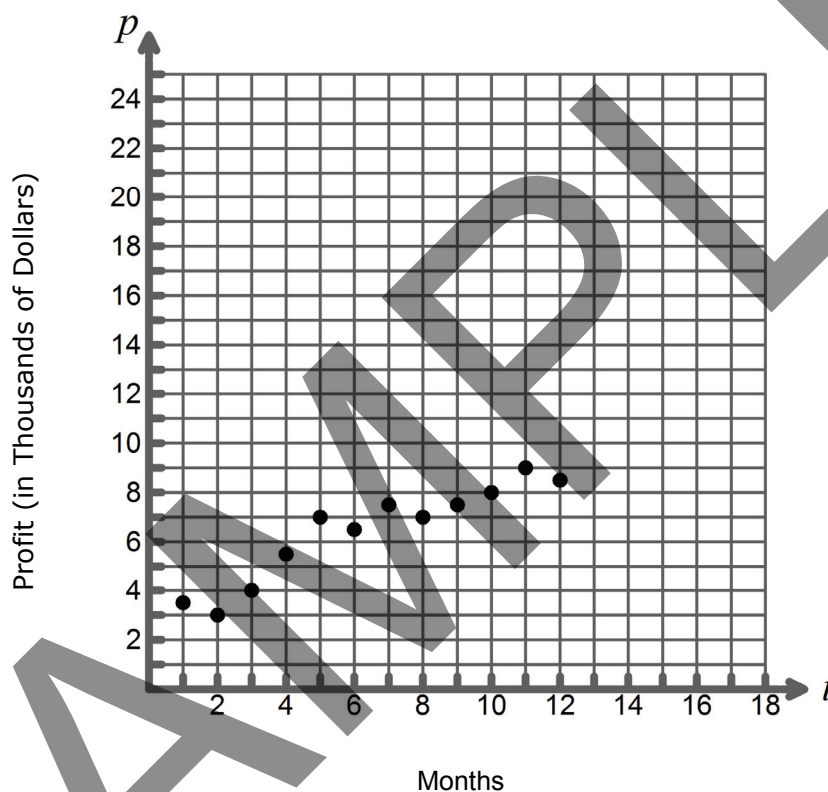
Coffee Shop Sales

Maurice and Beatrice opened a new store called The Trendy Café. Their goal is to reach a profit of \$25,000 in their 30th month of business. The table and scatterplot below represent the profit in thousands of dollars, p , that they made during the first 12 months.

The Trendy Café Profits

Months, t	1	2	3	4	5	6	7	8	9	10	11	12
Profit in Thousands of Dollars, p	3.5	3.0	4.0	5.5	7.0	6.5	7.5	7.0	7.5	8.0	9.0	8.5

The Trendy Café Profits



1. Draw a trend line for the data.
2. Determine the equation for the trend line.
3. What does the slope of the trend line mean in this situation?
4. If their profit continues along the trend line, predict whether Maurice and Beatrice will reach their goal in the 30th month of business. Justify your answer.

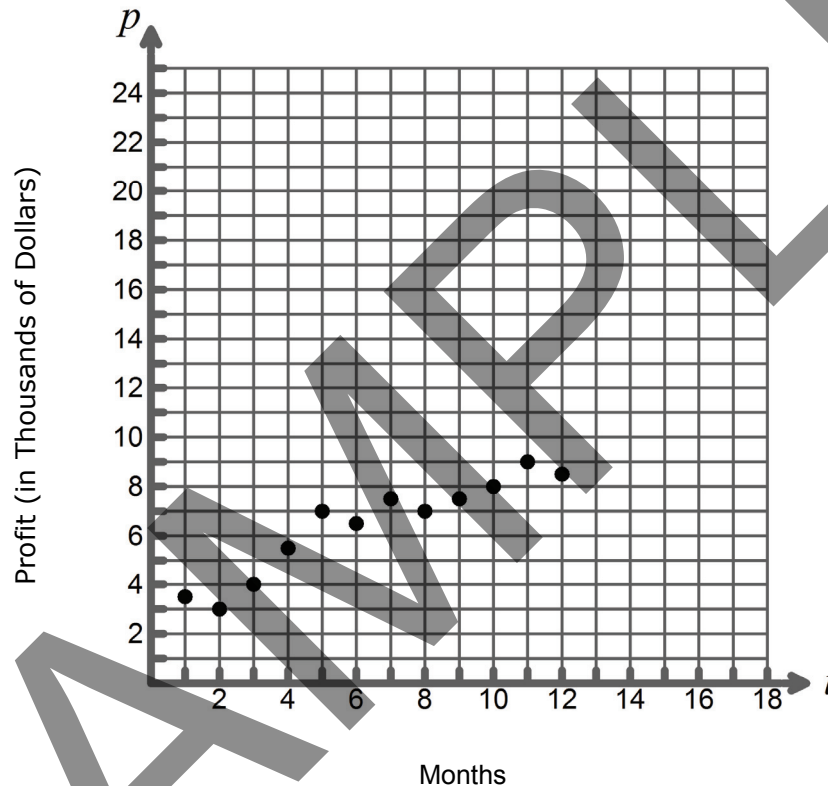
Coffee Shop Sales*

Maurice and Beatrice opened a new store called The Trendy Café. Their goal is to reach a profit of \$25,000 in their 30th month of business. The table and scatterplot below represent the profit in thousands of dollars, p , that they made during the first 12 months.

The Trendy Café Profits

Months, t	1	2	3	4	5	6	7	8	9	10	11	12
Profit in Thousands of Dollars, p	3.5	3.0	4.0	5.5	7.0	6.5	7.5	7.0	7.5	8.0	9.0	8.5

The Trendy Café Profits



1. What does the ordered pair $(12, 8.5)$ represent in this situation?
2. Draw a trend line for the data.
3. Select two points on the trend line.

(,) and (,)

4. Use the two points to determine the slope of the trend line.

5. What does the slope of the trend line mean in this situation?
6. Determine the y -intercept for the trend line.
7. Determine the equation for the trend line.
8. If their profit continues along the trend line, predict whether Maurice and Beatrice will reach their goal in the 30th month of business. Justify your answer.

SAMPLE