

Vertical Progression:

<p>8th Grade</p>	<p>8.SP.A Investigate patterns of association in bivariate data</p> <ul style="list-style-type: none"> ○ 8.SP.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. ○ 8.SP.2 Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line. ○ 8.SP.4 Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables.
<p>Algebra 1</p>	<p>ELG.MA.HS.S.2: Summarize, represent, and interpret data on two categorical and quantitative variables.</p> <ul style="list-style-type: none"> ○ S-ID.5 Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. ○ S-ID.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ○ S-ID.6a Fit a function to the data; use functions fitted to data to solve problems in the context of the data. <i>Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.</i> ○ S-ID.6b Informally assess the fit of a function by plotting and analyzing residuals. ○ S-ID.6c Fit a linear function for a scatter plot that suggests a linear association.
<p>Algebra 2</p>	<p>ELG.MA.HS.S.2 Summarize, represent, and interpret data on two categorical and quantitative variables</p> <ul style="list-style-type: none"> ○ S-ID.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ○ S-ID.6a Fit a function to the data; use functions fitted to data to solve problems in the context of the data. <i>Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models. [exponential and trigonometric models]</i>

Students will demonstrate command of the ELG by:

- Reading, interpreting, and plotting data using a scatter plot.
- Describing how data is related.
- Determining if a set of data can be represented by a linear or exponential function and finding either a linear or exponential function to fit the data.
- Using functions fitted to data to solve problems.

Vocabulary:

- exponential function
- linear function
- scatter plot

Sample Instructional/Assessment Tasks:

1) Standard(s): S-ID.6.a

Source: Engage New York

Item Prompt:

The table below contains U.S. census population.

- What would be appropriate function to model the data? Explain your reasoning.
- If we assume 1900 to be year 0, write a function to model the data.

Census Year	U.S. Population (in millions of people)
1900	76.2
1910	92.2
1920	106.0
1930	122.8
1940	132.2
1950	150.7
1960	179.3
1970	203.3
1980	226.5
1990	248.7
2000	281.4
2010	308.7

ELG HS.S.2: Summarize, represent, and interpret data on two categorical and quantitative variables

Correct Answer:

- a) exponential function with appropriate reasoning provided
- b) example function: $P(t) = 81.1(1.0126)^t$

2) Standard(s): S-ID.6.a

Source: <http://www.matthewhudock.com/PreCalch6sect6.pdf>

Item Prompt:

The data below represent the average monthly temperatures for the city of San Antonio, Texas.

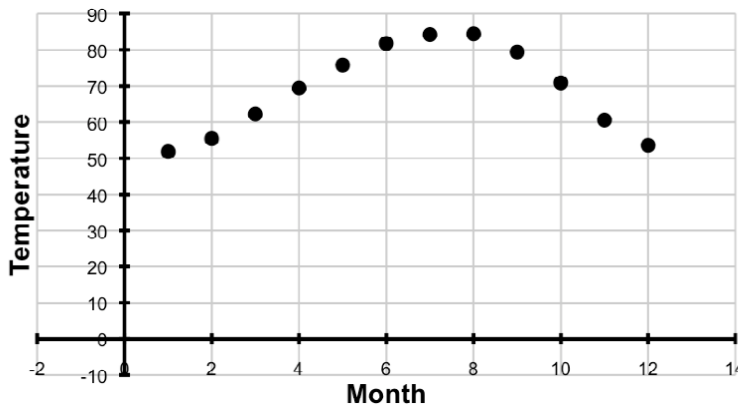
- a) Create a graph of the data and determine what type of function should be used to model the data. Explain your reasoning.
- b) Write a function to fit the data.

Month, x	Temperature, y
January, 1	51.8°
February, 2	55.4°
March, 3	62.2°
April, 4	69.4°
May, 5	75.8°
June, 6	81.8°

Month, x	Temperature, y
July, 7	84.2°
August, 8	84.4°
September, 9	79.4°
October, 10	70.9°
November, 11	60.6°
December, 12	53.6°

Correct Answer:

- a. Graph shown below. The data should be modeled by a trigonometric function based on the periodicity of the data.



- b. example function:

$$y = 16.3 \sin\left(\frac{\pi}{6}x - \frac{2\pi}{3}\right) + 68.1$$