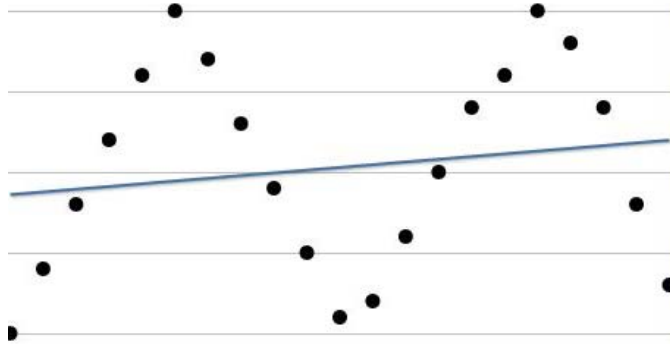


Modeling Periodic Phenomena with Trigonometric Functions - Guided Lesson Explanation

Explanation#1

First we solve the Question a- Plot the scatter graph



Then we solve the Question b- The data is periodic because it follows a cyclical and somewhat predictable pattern.

i) The horizontal line that the wave is half above and half below is called the principal axis. Since it is straight line the line just has a y value.

If we follow our line it will have a y value of about 10.

ii) The maximum value is the highest point. Since height is relative to the y value. We name the highest y value point we have it is 20 from the data given.

iii) A period is the length of one cycle of the wave. I like to look at either two maximum points or two minimum points and compare the distance.

The two maximum points are (125, 20) and (400, 20).

Calculate the change in x value : $400 - 125 = 275$.

iv) The amplitude is the height of the wave from the highest to the lowest point.

$$\text{Amplitude} = \frac{\text{maximum} - \text{minimum}}{2} = \frac{20 - 0}{2} = 10$$



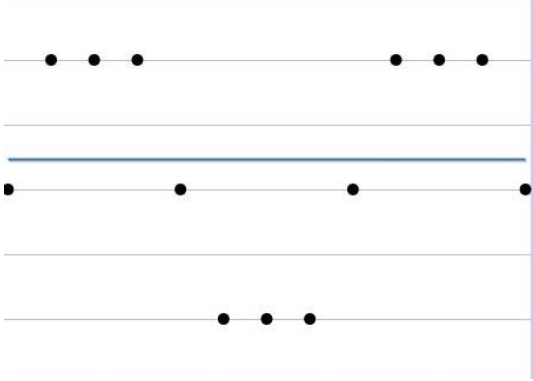
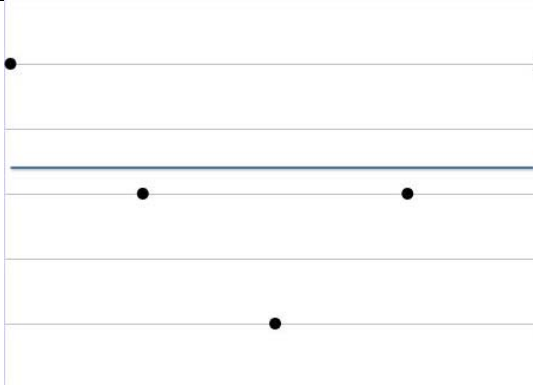
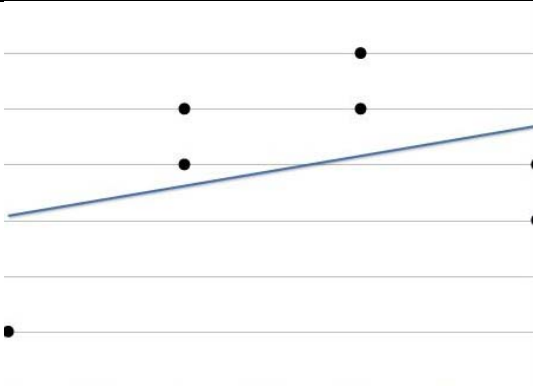
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Explanation#2

Any phenomena that has a behavior or pattern that repeats over time; in a somewhat predictable cyclical manner is referred to as periodic.

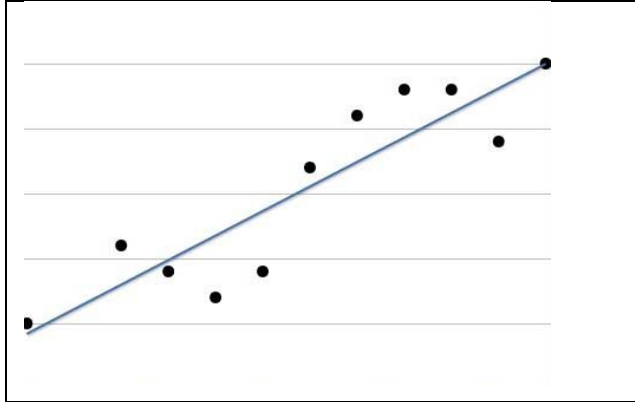
We will need to make four scatter plots and see if there is a repetitive pattern in any of the graphs.

| | |
|--|---|
|  <p>A scatter plot on a grid with a horizontal blue line. The data points are arranged in three horizontal rows. The top row has three points on the left and three on the right. The middle row has four points spaced evenly across the width. The bottom row has three points in the center.</p> | <p>Yes, this data displays periodic behavior. We can see the beginning of a cyclic pattern here.</p> |
|  <p>A scatter plot on a grid with a horizontal blue line. The data points are scattered: one at the top left, one at the top right, one in the middle left, one in the middle right, and one in the bottom center.</p> | <p>No, this data does not display periodic behavior. We do not see any signs of a repeat value in here.</p> |
|  <p>A scatter plot on a grid with a diagonal blue line sloping upwards from left to right. The data points are scattered around the line: one at the bottom left, one in the middle left, one in the middle right, one at the top right, and one at the bottom right.</p> | <p>No, this data does not display periodic behavior. We do not see any signs of a repeat value in here.</p> |



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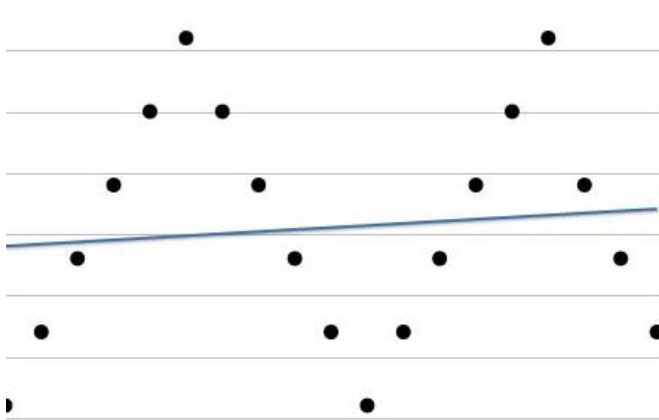
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This data does display periodic behavior. You need to remember that periodic behavior is not perfect, but approximate. In this case the data seems move back and forth across the line.

Explanation#3

Then we solve the Question a- Plot the scatter graph



Step 3) Then we solve the Question b- The data is periodic because it follows a cyclic and somewhat predictable pattern.

i) The horizontal line that the wave is half above and half below is called the principal axis. Since it is straight line the line just has a y value.

If we follow our line it will have a y value of about 10.

ii) The maximum value is the highest point. Since height is relative to the y value. We name the highest y value point we have it is 18 from the data given.

iii) A period is the length of once cycle of the wave. I like to look at either two maximum points or two minimum points and compare the distance.



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The two maximum points are (120, 18) and (320, 18).

Calculate the change in x value : $320 - 120 = 200$

iv) The amplitude is the height of the wave from the highest to the lowest point.

$$\text{Amplitude} = \frac{\text{maximum} - \text{minimum}}{2} = \frac{18 - 0}{2} = 9$$

