



Sonata No. 1 Op.78 in G

violin and piano (1879)



- Motion that repeats at regular intervals of time

A musical staff with five red lines on a black background. On the left, there are three yellow eighth notes ascending. On the right, there are two yellow eighth notes descending. The word "Definitions" is written in yellow text across the middle of the staff.

Definitions

● Oscillation

- ◆ One complete round trip
of the motion



● Period

- ◆ The time required for one complete oscillation



- Frequency

- ◆ The number of
oscillations per second



● Equilibrium Position

- ◆ The rest (or neutral)
position



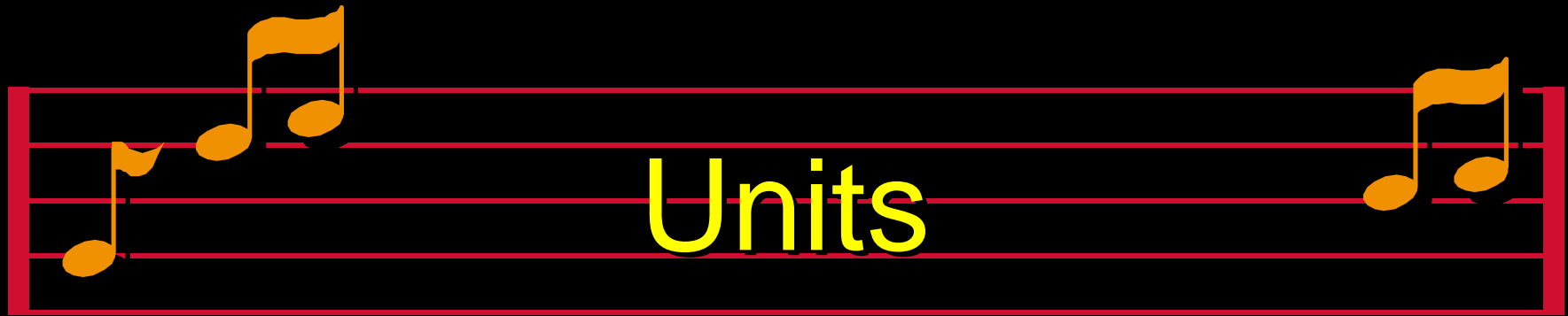
● Displacement

- ◆ The distance from the equilibrium position

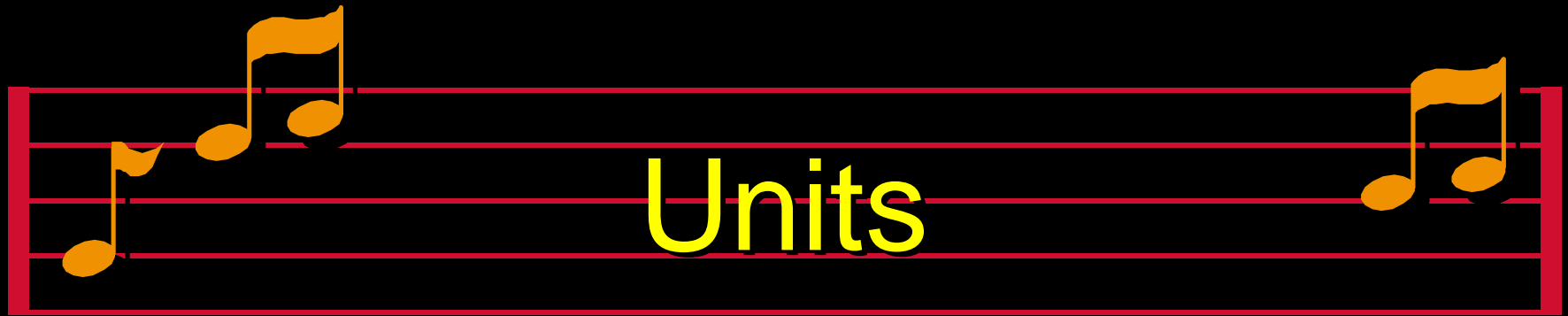


● Amplitude

- ◆ The maximum displacement (absolute value)



- ***Period*** - Time (Usually seconds)
- ***Frequency*** - Oscillations (or cycles) per second
 - ◆ One cycle per second is called one ***Hertz*** (Hz)




- ***Displacement*** - Distance
 - ◆ May be cm, m, ft, degrees, etc.
- ***Amplitude*** - Distance
 - ◆ May be cm, m, ft, degrees, etc.



$$f = 1/T$$


or

$$T = 1/f$$

A graphic of a musical staff with five red lines. On the left, there are three yellow notes: a quarter note on the first line, an eighth note on the second line, and a quarter note on the third line. On the right, there are two yellow notes: a quarter note on the second line and a quarter note on the third line. The title "Experimental Observations" is written in large yellow letters across the middle of the staff.

Experimental Observations

- The frequency is independent of the amplitude
- The greater the inertia factor, the less the frequency
- The greater the stiffness factor, the greater the frequency

A musical staff with five red lines and a red vertical bar on the left. It contains several yellow musical notes of varying heights and positions. The title "Experimental Observations" is written in large yellow font across the staff.

Experimental Observations


W(N)	T(s)	f(Hz)
0.50	0.142	7.04
1.00	0.200	5.00
2.00	0.284	3.52
4.00	0.40	2.50
8.00	0.568	1.76



- Relation between frequency and weight:



- Relation between frequency and spring constant:

A graphic of a musical staff with five red lines. On the left, there are three yellow notes: a quarter note on the first line, an eighth note on the second line, and a quarter note on the third line. On the right, there are two yellow notes: a quarter note on the third line and a quarter note on the fourth line. The title "Experimental Observations" is written in large yellow letters across the middle of the staff.

Experimental Observations

- The frequency is independent of the amplitude
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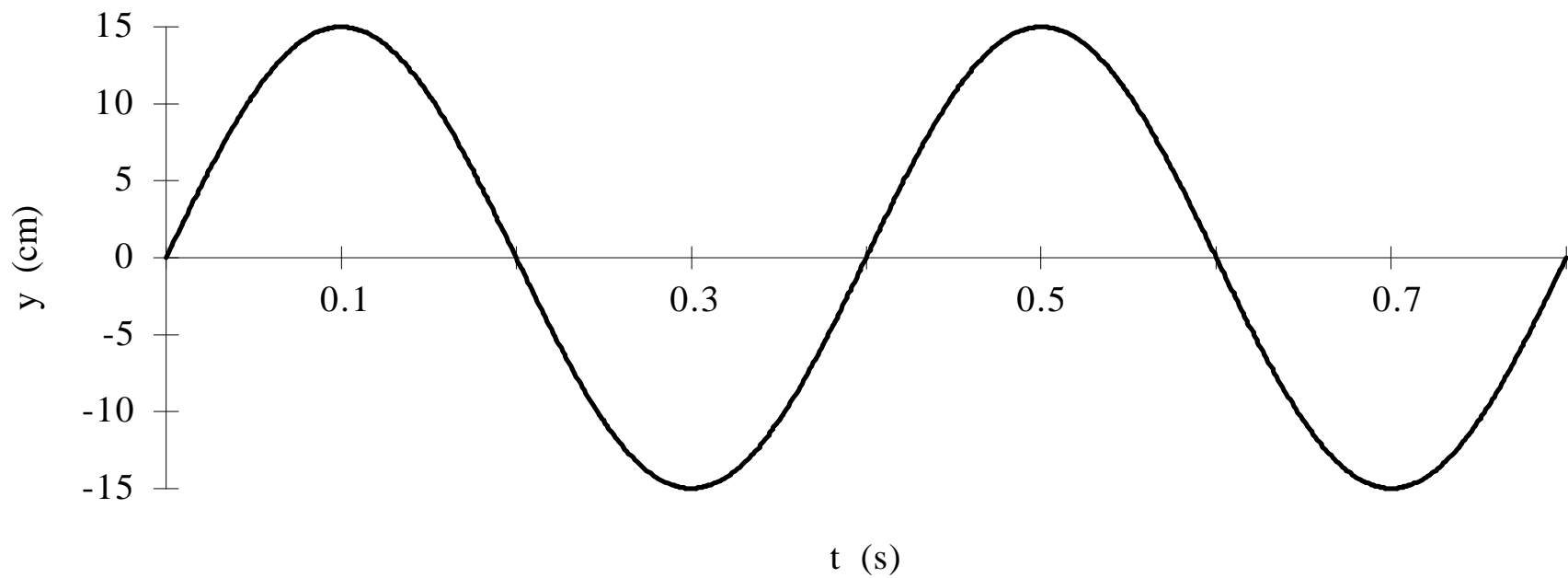


- Occurs whenever an oscillating system is driven at its natural frequency



- Under resonant conditions, a system oscillates at its maximum amplitude

Graphing





- In Phase (0 degrees)
- Out of Phase (180 degrees)
- Measured in degrees