RESONANCE Sim.

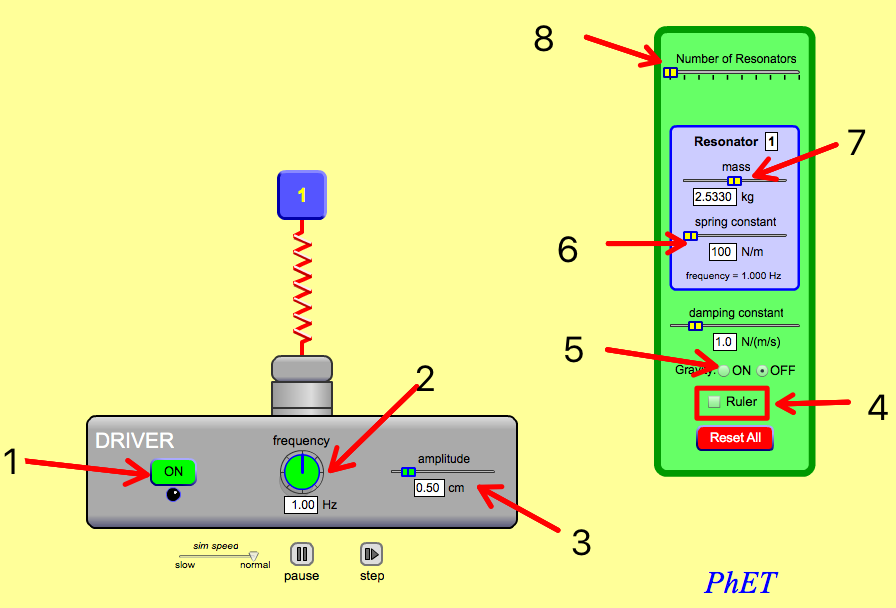
1. Objective: To determine what are the factors affecting resonance.
2. Materials:

PhET Simulation on Resonance

Activity sheet

Pen

1. Procedure:
   1. Open the PhET Simulation on Resonance distributed last week.
   2. Explore the sim and play around with the functionalities.



Functions:

1. Turns On/Off the frequency driver.
2. Increase/decrease the frequency.
3. Increase/decrease the amplitude.
4. Includes ruler on the screen.
5. Toggles gravity On/Off.
6. Increase/decrease spring constant.
7. Increase/decrease mass.
8. Increase/decrease number of resonators
   1. Activity proper:

PART I. Varying ***spring constant***

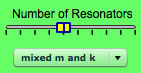
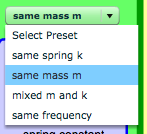
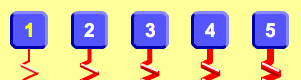
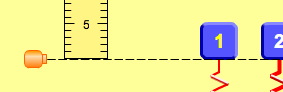
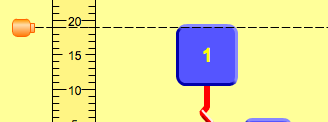
* + 1. Click to reset all values.
    2. Add three (3) resonators and click the down scroll named “mixed m and k” and choose “***same mass m***” .
    3. Include ruler and adjust the position of the ruler so that all resonators start at 0 cm .
    4. Click each resonator number and record the spring constant on Table 1 below.
    5. Turn on the frequency generator and observe the amplitude of each resonator.
    6. Record the maximum amplitude of each resonator on Table 1. Adjust the ruler’s horizontal line to record the amplitude accurately .
    7. Now adjust the frequency to 1.5 Hz and record again the amplitude of each resonator.
    8. Adjust again the frequency to 2.0 Hz and record the amplitude of each resonator.

Table 1. Spring constant vs. resonating frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Resonators | Spring constant | *Amplitude (cm)* | | |
| 1.0 Hz | 1.5 Hz | 2.0 Hz |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |

* + 1. Follow-up questions:
    2. In table 1, which of the resonators has higher amplitude at:
       1. frequency of 1.0 Hz? \_\_\_\_\_. What is its amplitude? \_\_\_\_\_\_\_.
       2. frequency of 1.5 Hz? \_\_\_\_\_. What is its amplitude? \_\_\_\_\_\_\_.
       3. frequency of 2.0 Hz? \_\_\_\_\_. What is its amplitude? \_\_\_\_\_\_\_.
    3. What happens to the resonating frequency when the spring constant is increased?

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* + 1. What happens to the amplitude when the spring constant is increased?

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PART II. Varying ***mass***

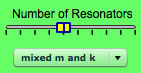
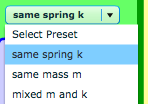
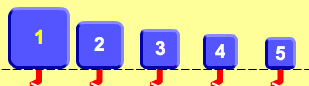
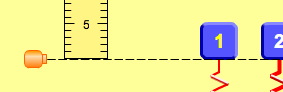
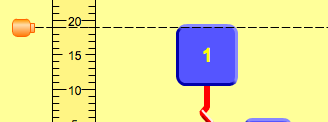
1. Click to reset all values.
2. Add three (3) resonators , click the down scroll and choose “same spring k” .
3. Include ruler and adjust the position of the ruler so that all resonators start at 0 cm .
4. Click each resonator number and record the mass on Table 2 below.
5. Turn on the frequency generator and observe the amplitude of each resonator.
6. Record the maximum amplitude of each resonator on Table 2. Adjust the ruler’s horizontal line to record the amplitude accurately .
7. Now adjust the frequency to 1.5 Hz and record again the amplitude of each resonator.
8. Adjust again the frequency to 2.0 and record the amplitude of each resonator.

Table 2. Mass vs. resonating frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Resonators | Mass (Kg) | *Amplitude (cm)* | | |
| 1.0 Hz | 1.5 Hz | 2.0 Hz |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |

1. Follow-up questions:
2. In table 2, which of the resonators has higher amplitude at:
   * + 1. frequency of 1.0 Hz? \_\_\_\_\_. What is its amplitude? \_\_\_\_\_\_\_.
       2. frequency of 1.5 Hz? \_\_\_\_\_. What is its amplitude? \_\_\_\_\_\_\_.
       3. frequency of 2.0 Hz? \_\_\_\_\_. What is its amplitude? \_\_\_\_\_\_\_.
3. What happens to the resonating frequency when the spring constant is increased?

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1. What happens to the amplitude when the spring constant is increased?

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