Name:

Date:

Hour:

# Transverse Wave Lab

Materials:

Length of clothesline

Meterstick

Yarn

Table leg

Stopwatch

Procedure:

1. Tie the length of clothesline as high up as possible on the lab table leg.
2. All of your group members should be eye level with the rope.
3. Tie pieces of yarn to the clothesline at .5 m intervals.
4. Create transverse waves in the clothesline by moving the free end up and down at a steady rate. The “wavemaker” should practice first from a crouched position. The rope should be perfectly level.
5. Count the number of waves you create in 60 seconds. You can count this by counting the number of times your hand starts from the “up” position and returns to the “up” position. You can also watch one yarn marker and count the number of times it returns to the original position you began counting at. One student should be timing with the stopwatch.
6. Record this number in the second column of Table 1 in the Natural row.
7. Divide number of waves by 60 to get frequency.
8. Record that number in the third column of Table 1 in the Natural row.
9. Slow the rate at which you are moving the rope.
10. Predict what will happen to the frequency.

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1. Repeat Step 4.

1. Record this number in the second column of Table 1 in the Slower row.
2. Divide number of waves by 60 to get frequency.
3. Record that number in the third column of Table 1 in the Slower row.
4. Move the rope faster.
5. Predict what will happen to frequency.

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1. Repeat Step 4, recording your numbers in the Faster row.
2. Now one student will create 60 waves in 60 seconds. One student will time with the stopwatch. The rest of the group will observe the yarn lengths to determine the measurement of one wavelength (from crest to crest or trough to trough). Enter your values for frequency and wavelength in Table 2 in the A row.
3. Now one student will create 120 waves in 60 seconds. Before you do this, make a prediction. Is the frequency greater or smaller? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Should the wavelength be greater or smaller?

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1. One student will time with the stopwatch. The rest of the group will observe the yarn

lengths to determine the measurement of one wavelength (from crest to crest or trough to trough). Enter your values for frequency and wavelength in Table 2 in the B row.

1. Use the equation for speed of a wave. Enter this value in the last column of Table 2.

TABLE 1

|  |  |  |
| --- | --- | --- |
| Wave Motion | Number of Waves in 60 seconds | Frequency (Hz) |
| Natural |  |  |
| Slower |  |  |
| Faster |  |  |

TABLE 2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Wave Motion | Number of Waves in 60 seconds | Frequency (Hz) | Wavelength (m) | Speed (m/s) |
| A | 60 |  |  |  |
| B | 120 |  |  |  |

Conclusion:

1. As you increased the motion of the rope, what happened to the frequency? As you decreased the motion of the rope, what happened to the frequency?

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1. As the frequency of the wave increased, what happened to the wavelength? As the frequency decreased, what happened to the wavelength? Are frequency and wavelength directly or inversely proportional?

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1. As frequency increased, speed should have remained constant. This means that frequency and wave speed are independent of each other. What were your results? If this is not what happened with your data, what errors could have occurred?

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1. Sketch your waves from Row A of Table 2. Indicate the measurement for wavelength, and label trough, crest and amplitude.