

## Frequency Problems

1. A tennis coach paces back and forth along the sideline 10 times in 2 minutes. The frequency of her pacing is \_\_\_\_\_ Hz.

- a. 5.0                      b. 0.20                      c. 0.12                      d. 0.083

2. Non-digital clocks have a second hand that rotates around in a regular and repeating fashion. The frequency of rotation of a second hand on a clock is \_\_\_\_\_ Hz.

- a.  $1/60$                       b.  $1/12$                       c.  $1/2$   
d. 1                              e. 60

3. Olive Udadi accompanies her father to the park for an afternoon of fun. While there, she hops on the swing and begins a motion characterized by a complete back-and-forth cycle every 2 seconds. The frequency of swing is \_\_\_\_\_.

- a. 0.5 Hz                      b. 1 Hz                      c. 2 Hz

### Harder Problems

#### Problem 1:

It is said that one can even observe the vibrational motion of the Sears Tower in Chicago on a windy day. As the Sears Tower vibrates back and forth, it makes about 8.6 vibrations in 60 seconds. Determine the frequency of the vibration of the Sears Tower.

#### Problem 2:

The spin rate of a CD-ROM varies according to the location on the disc from where data is being accessed. When accessing data from the inner circles of the disc, the CD can spin at a rate as high as 400 revolutions per minute. Determine the frequency (in Hertz) of the spinning CD.

**Problem 3:**

Extreme waves along ocean waters, sometimes referred to as *freak waves* or *rogue waves*, are a focus of much research and study among scientists. Several merchant ships reports rogue waves which are estimated to be 25 meters high and 26 meters long. Assuming that these waves travel at speeds of 6.5 m/s, determine the frequency of these waves.

**Problem 4:**

Sachi is rock'n to her favorite radio station - 102.3 FM. The station broadcasts radio signals with a frequency of  $1.023 \times 10^8$  Hz. The radio wave signal travel through the air at a speed of  $2.997 \times 10^8$  m/s. Determine the wavelength of these radio waves.

**Problem 5:**

A marine weather station detects waves which are 9.28 meters long and 1.65 meters high and travel a distance of 50.0 meters in 21.8 seconds. Determine the frequency of these waves.

**Problem 6:**

Ryan and Carson observed that the piers made a complete up and down vibration cycle in 6.6 seconds. The piers were positioned a distance of 24 meters apart. When one pier was at a high position, the neighboring pier was at a low position and there was exactly one wave crest between them. Determine the wavelength, and frequency of the waves.

Key

## Frequency Problems

**Problem 2:**

Strong winds can apply a significant enough force to tall skyscrapers to set them into a back-and-forth motion. The amplitudes of these motions are greater at the higher floors and barely observable for the lower floors. It is said that one can even observe the vibrational motion of the Sears Tower in Chicago on a windy day. As the Sears Tower vibrates back and forth, it makes about 8.6 vibrations in 60 seconds. Determine the frequency of the vibration of the Sears Tower.

**Answer:** 0.14 Hz**Problem 3:**

The spin rate of a CD-ROM varies according to the location on the disc from where data is being accessed. When accessing data from the inner circles of the disc, the CD can spin at a rate as high as 400 revolutions per minute. Determine the frequency (in Hertz) of the spinning CD.

**Answer:** 6.67 Hz**Problem 5:**

Extreme waves along ocean waters, sometimes referred to as *freak waves* or *rogue waves*, are a focus of much research and study among scientists. Several merchant ships reports rogue waves which are estimated to be 25 meters high and 26 meters long. Assuming that these waves travel at speeds of 6.5 m/s, determine the frequency of these waves.

**Answer:** 0.25 Hz**Problem 10:**

Sachi is rock'n to her favorite radio station - 102.3 FM. The station broadcasts radio signals with a frequency of  $1.023 \times 10^8$  Hz. The radio wave signal travel through the air at a speed of  $2.997 \times 10^8$  m/s. Determine the wavelength of these radio waves.

**Answer:** 2.930m**Problem 12:**

A marine weather station detects waves which are 9.28 meters long and 1.65 meters high and travel a distance of 50.0 meters in 21.8 seconds. Determine the frequency of these waves.

**Answer:** 0.247 Hz**Problem 15:**

Ryan and Carson attended their church's youth retreat at Camp Paradise this past fall. On Saturday afternoon they took a walk out to the harbor and watched incoming waves from Lake Michigan rock the boating piers up and down. Ryan and Carson observed that the piers made a complete up and down vibration cycle in 6.6 seconds. The piers were positioned a distance of 24 meters apart. When one pier was at a high position, the neighboring pier was at a low position and there was exactly one wave crest between them. Determine the wavelength, and frequency of the waves.

**Answer:** wavelength- 16m      frequency- 0.15Hz