

Instructions and Tips

- The speed of sound in air (c_{air}) is $= 340 \text{ m}\cdot\text{s}^{-1}$; the speed of sound in water (c_{water}) is $= 4\cdot c_{\text{air}}$.
- Remember that $\log_{10}(2) = 0.3$.
- A calculator is not necessary to answer any of these questions.

1. Write the equation for a line with a slope of 1, 3 and 5, each having a y-intercept equal to its slope.
 - (a) Line 1:
 - (b) Line 2:
 - (c) Line 2:
2. Draw the *unit circle* and label points at every $\pi/4$ radians starting from $x=1, y=0$. What angle (θ) in degrees corresponds to each $\pi/4$ radian point starting from $x=1, y=0$?
3.
 - (a) Write the equation that describes the instantaneous pressure, $P(t)$, of a sine wave with a peak amplitude of 4 Pascals (Pa), a period (T) of 1 ms, and a starting phase angle (θ) of 3.14 radians (rad).
 - (b) Write the equation for the instantaneous pressure of the above sound if the frequency (f) is doubled and the starting phase angle (θ) is shifted by -90° .
 - (c) Write the equation that describes the instantaneous pressure, $P(t)$, of a sine wave with a peak amplitude of 0.01 Pa, a frequency (f) of 5000 Hz, and a starting phase angle (θ) of 270° .

4. What is the period (T) of a sine wave with a frequency (f) of:
- (a) 10 Hz?
 - (b) 100 Hz?
 - (c) 333 Hz?
 - (d) 500 Hz?
 - (e) 1000 Hz?
 - (f) 2 kHz?
 - (g) 5 kHz?
 - (h) 10 kHz?
5. What is the frequency (f) of a sine wave with a period (T) of:
- (a) 1000 ms?
 - (b) 200 ms?
 - (c) 20 ms?
 - (d) 0.333 ms?
 - (e) 0.1 ms?
 - (f) 0.01 ms?
- (g) If the signals in Q#5 were sounds, which one(s) could a human **NOT** hear?
6. Draw the sine waves described by the following equations. Be certain to label both axes.
- (a) $D(t) = 4 \cdot \sin(2\pi \cdot 10 \cdot t)$
 - (b) $D(t) = 4 \cdot \sin(2\pi \cdot 10 \cdot t - \pi)$
- (c) What would be heard if the sine waves in 6(a) and 6(b) were played simultaneously from a speaker?
7. Provide the answer to the following logarithmic expressions.
- (a) $\log_{10}(10) =$
 - (b) $\log_{10}(100) =$
 - (c) $\log_{10}(20) =$
 - (d) $\log_{10}(10^5) =$
 - (e) $\log_{10}(10^6/2) =$
 - (f) $\log_{10}(10^7/10) =$
 - (g) $\log_{10}(2) =$

(h) $\log_{10}(0.5) =$

(i) $\log_{10}(0.05) =$