

Questions on Simple Harmonic Motion.

1. How is sound created?
2. How would you determine the period of a pendulum?
3. How are frequency and period related?
4. Define the units of frequency.
5. What is the difference between ‘amplitude’ and ‘displacement’? In the strict sense, why aren’t these terms interchangeable?
6. If the period of an oscillation doubles, what happens to the frequency?
7. The frequency of a middle C sound wave is 262 Hz. What period of oscillation produces this sound?
8. What is the period of oscillation of a string if the frequency is 200 Hz?
9. What is the frequency of oscillation if the period is 1.2 s?
10. A cork fishing float bobs up and down 15 times per minute. What is period of oscillation in seconds? What is the frequency in Hertz?
11. The frequency of a local radio station is 89.3 MHz (M = mega = 10^6). What is the period of oscillation of the electromagnetic waves of this signal?
12. If the CPU of a computer from 1998 is 200 MHz, what would the period of oscillation be?
13. Suppose a vibrating guitar string moves a total distance of 1.0 cm from it’s maximum in one direction to the maximum in the other direction. What is the maximum amplitude for this motion?
14. Suppose a clarinet reed vibrates with a maximum amplitude of 0.04 cm. How far does it travel in one complete cycle (all the way back to its starting point)?
15. What does the phase of an oscillation tell you about its motion?
16. A phase of 270 degrees is how many radians?
17. A phase of 200 degrees is how many radians?
18. What is Hooke’s Law and why is it important?
19. Define simple harmonic motion.
20. What conditions are required for simple harmonic motion to occur?
21. Which has the larger frequency, a stiff spring or a soft spring?
22. If you hang a larger mass on the same spring, what happens to its period?
23. The average guitar has six strings each in ascending thickness. Based on your answer to the previous question, how might the thickness affect the frequency of the sound from each string when plucked?
24. What is the difference between simple harmonic motion and damped, driven harmonic motion?
25. What is the difference between a linear force and a non-linear force?
26. What kind of clarinet reed would more easily play low frequency notes, a stiff reed or a soft reed (assuming the mass is the same)? Explain your thinking.
27. What kind of saxophone reed would more easily play low frequency notes, a thick, heavy reed or a thin, light reed (assuming the stiffness is the same)? Explain your thinking.
28. The mathematical description of SHM is given by $y(t) = A\cos(2\pi ft + \phi)$. Explain what each of the terms ($y(t)$, A , \cos , π , f , t , ϕ) represent in the motion of a mass on a spring.