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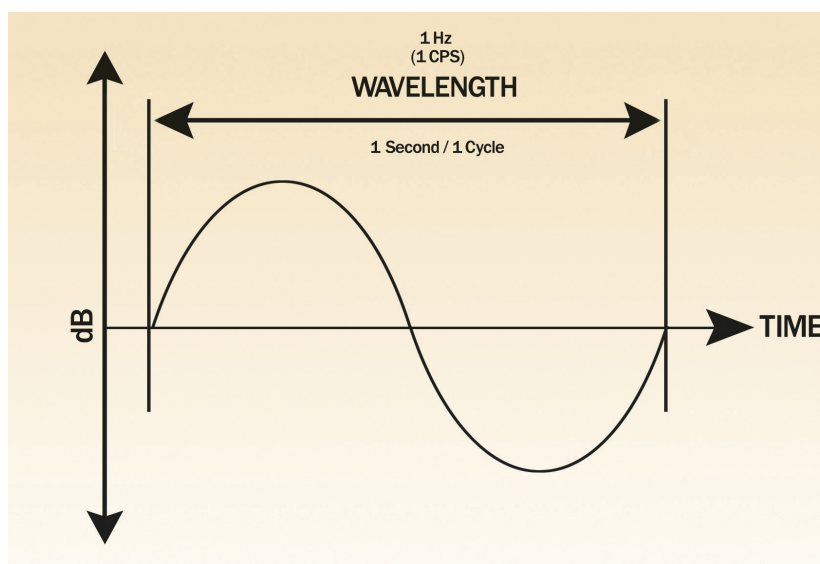
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Frequency: Timbre

Sound can be quantified by three measures: *amplitude*, *frequency* and *time*. These are the three components of sound, whether captured or free. Amplitude should be a familiar term (aka volume) as should time, but timbre and frequency might be new terms for some. The frequency of a sound defines its *pitch* (musical note value), while timbre (pronounced “TAM-bur”) is the overall tonal quality of a sound that allows the listener to distinguish one instrument or voice from another. Timbre cannot be quantified solely through measures of pitch or amplitude; it is the *quality* of the sound, the timbre, that lets humans differentiate a saxophone from a trumpet, even when both instruments are playing the same pitch at the same loudness.

The most basic form of sound is represented by something called the *sine wave*. Remember that sound is a 360-degree mechanical energy burst through a medium, and as such, its pushing, then pulling, behavior causes peaks and troughs in the energy wave. This is exactly the same as a familiar mathematical function called the sine wave, as seen in **Figure 1.03**. The sine wave is an even energy wave whose ridges and troughs are the same size and shape and do not change over time. Each rotation through the up and down portions of the wave is called a *cycle*. This simple one-cycle sine wave is literally the building block of sound, much like the atom is the building block of matter.

Figure. 1.03: A standard sine wave, measuring 1 Hz, meaning 1 cycle per second (cps). This is called the *wavelength*.



When drawn as a mathematical expression, a sine wave demonstrates this pushing and pulling energy, as seen in **Figure 1.04**. The curve of the wave is perfectly even and the top and bottom of the wave are exactly the same distance away from the zero line. This means that the energy starts at zero (standing still) until the burst is created, at which point the wave pushes outward, called *compression*, and then pulls back, called *rarefaction*, just as hard as it pushed out. In other words, the wave pushes and pulls repeatedly at a fixed rate, measured over the course of a second. Each repetition is called a “cycle.” Frequency can thus be defined as the number of times a wave pushes and pulls in one second, which is expressed in, *Hertz* or *cycles per second*.

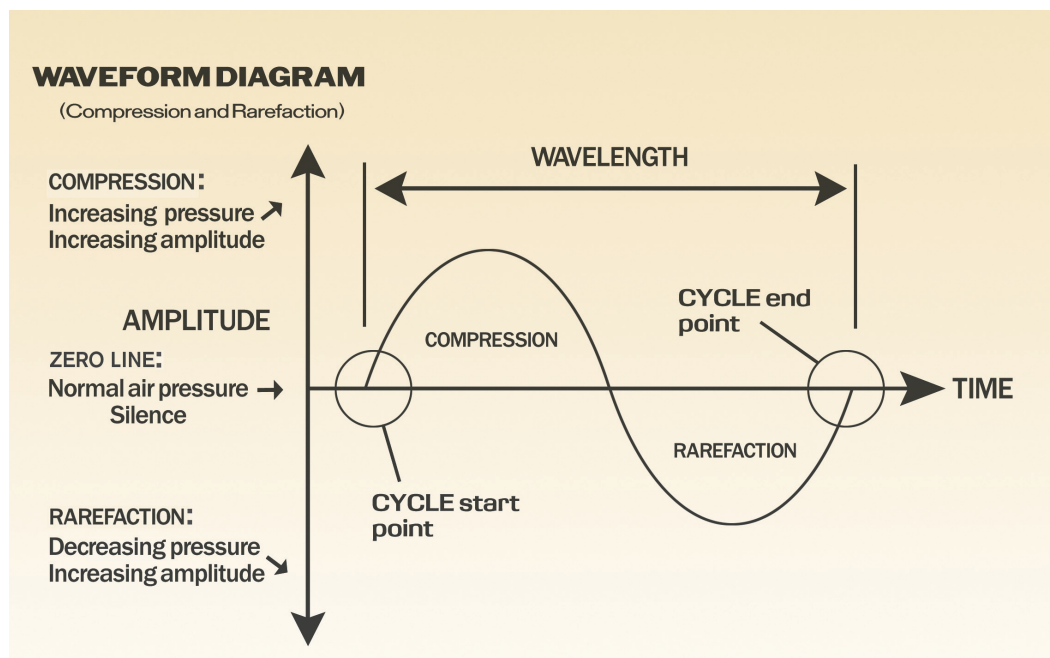


Figure 1.04: A simple sine wave showing the beginning and end of a cycle, as well as compression and rarefaction.

COACH'S CORNER

The sine wave is important to us for many reasons, but is most important mathematically because it represents a circular motion over time. Envision a world map where the world is laid out horizontally with funny curves as it tries to take the circular globe and represent it on a flat page. The math behind sound waves is called trigonometry. Trigonometry defines several functions, including cosines and tangents, but for audio purposes, we will concentrate on the sine wave.

Tech-Speak: Octave

An octave (*8va*) is a pitch at double or half the frequency of another frequency. In musical terms, it's the same note at a higher or lower level, as in from C to the next C, etc. Mathematically, it refers to a frequency that is double (or half) the original frequency as you go up (or down) in Hz.

The harmonic series is another of those “miracles” of music, in that this collection of tones provides the foundation of certain disciplines in music, instrument design, equipment manufacturing, acoustics, and synthesis. This concept is very important to understand and become familiar with, so let's refer back to the CDs, to listen to various harmonics and hear what they are.

Let's start with a simple sine wave vibrating at 110 Hz. The wave of energy is pushing (via compression) and pulling (via rarefaction) 110 times per second. Listen to the accompanying **DVD Track 4** to hear about 20 seconds of 110 Hz.



DVD Track 4: A 110 Hz sine wave being played for about 20 seconds. Can you find the note on the piano?

In this case, the fundamental is the 110 Hz tone. Multiplying 110 by 2 gives us 220 Hz—known as the first overtone or the *second harmonic* (the first fundamental is the harmonic). Now listen to it next to its fundamental and see what it sounds like.



DVD Track 5: Two sine waves played one into the other—110 Hz, then 220 Hz. Can you find the note matching 220 Hz on the piano?

Surprisingly, it's actually the same note, played an octave higher. But what happens if you do the math again, one step higher? Now, let's listen to the fundamental, 110 Hz, $\times 3$ —which is the second overtone, 330 Hz.



DVD Track 6: Three sine waves played back to back—110 Hz, 220 Hz, and then 330 Hz. Can you find all three on the piano?

Now, we have three notes, all built from the same fundamental, but not all at the same pitch. You can imagine that this can go on for a little while. So let's shortcut the process and go up to the eighth harmonic.

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Everyone at Pyramind knows that we're part of a larger musical community. As a part of that whole, we've learned that no art is created alone—it's the people around us that make the art special. This book, and all of the books in the Pyramind series, is the result of all the good people in the Pyramind community. From the authors, the graphic designers, and audio collectors, to all of the support staff that keeps the place humming day in and day out, these works represent the collected efforts of our entire team. There are some teammates that deserve special mention for their extra effort and dedication on this particular book. It's been a pleasure to work with all of them at Pyramind and I am extremely proud of every contributor. I've listed them here to give them a heartfelt thanks for everything they've done, both for this project and for Pyramind every day.

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– Matt Donner, author, teacher, producer, coach, CAO, and COO at Pyramind, project manager, and a few hundred other things

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DVD Callout: I-IV-V Rhythm Practice, Part 5

At this point, I'd like to ask you to take a moment and breathe. You are now just about halfway through this book and although we've only covered the C major scale, we've actually covered a tremendous amount of music theory and application. You should pat yourself on the back and feel very good about your progress. If you have kept up with your playing and your practicing, you should be ready for what amounts to a mid-term exam! I know you just *love* those!

If you can do the Basic Chops Test you get a score somewhere between a C– and a B+. If you can't even do this bit, you get a D. That's a good indication that you need to go back and try again—seriously this time. It's like a diet—if you cheat on it, the results are in the scale. Get it? Scale? [groan]

If you can do the Basic Chops Test, then try the advanced stuff. Just trying gets you a B+, even if you can't do it well. Nailing it gets you an A and a gold star! It also means that you're practicing well and progressing well. Remember that there's no finish line—only your progress and the betterment of your music. You should know by now if that's actually getting better. It always does. Always.

If you're practicing, that is.

Chops Test—The C Major Scale, Intervals, Dyads, Triads, Inversions, and Voice Leading

Basic Chops

By now, you should be able to do the following:

- ☛ Play the C major scale with both hands—separate and together—up and down the octave to a metronome. You should be able to do so while switching your fingering correctly—after the thumb in the LH and after middle finger in the RH as follows:

Right hand (RH): CDEFGABC 123–12345

Left hand (LH): CDEFGABC 54321–321

- ☛ Play the C major scale in intervals, from C to D, then C to E, and so on, up to C (the octave C) up and down in both hands—separately and together.

Mixolydian Mode

Next on the list of modes is the Mixolydian. We're learning this one next for three reasons—it's easy to learn, it's the next brightest after the Ionian, and it's one of the more popular modes. In terms of "brightness" or "happiness," so far (from brightest down) the brightest is Lydian, then Ionian (already covered), and now, Mixolydian.

The Mixolydian mode is built from the fifth scale degree of the Ionian mode in the same way that the Lydian mode is built from the fourth scale degree of the Ionian mode. So, similar to the Lydian mode, you *could* simply start on G and run through the notes of the C major mode back to G, as seen in **Figure 7.5**. You can hear it on **Audio Track 91**.

G Mixolydian

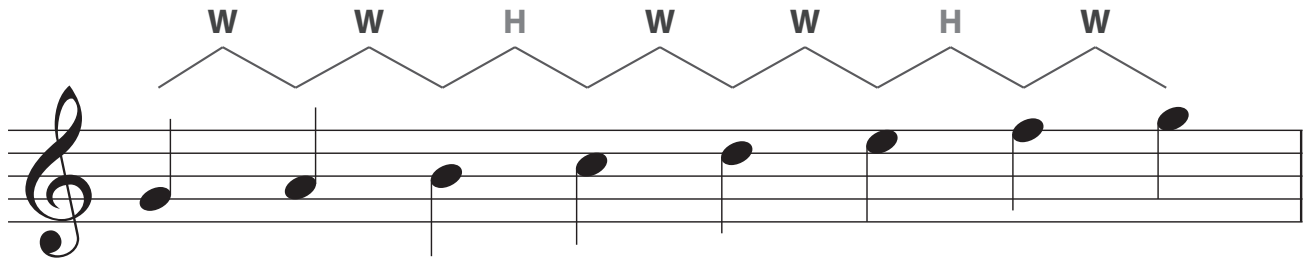
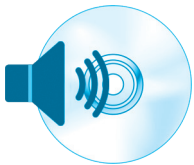


Figure 7.5: The notes of G Mixolydian



Audio Track 91: The G Mixolydian scale.

Looking at G Mixolydian again, the notes are:

GABCDEFG

Looking deeper, the relationship between the notes is as follows:

G to A: whole step

A to B: whole step

B to C: half step

C to D: whole step

D to E: whole step

E to F: half step

F to G: whole step

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Change Is the Constant

“Forward, Never Straight”



DVD: Studio-Side Chat

Chapter 2: Music as Digital Media

Effect on major labels-leveling the playing field: 7:27–9:30

DVD-ROM Support Doc:
“32 Different Ways Artists Can Make Money”

There was a time when the music industry was made up of specialists—the songwriters wrote songs, the performers performed, engineers and producers recorded and produced and labels were run by businessmen. Needless to say, times have changed dramatically. The evolution of technology has lowered the barriers of entry (price, technical knowledge etc.) and allowed many more would-be artists to try their hand at producing and selling music. This change in technology and production process has opened the gates for a whole new era of recording artist/entrepreneur (The “*entre-producer*”), but in turn has created a whole new breed of professional faced with the challenge of integrating many of the jobs that were once the role of seasoned veterans and specialists.

At the turn of the century, the Internet as a means of promoting and distributing music hit the industry hard. Many have referred to this as a “leveling of the playing field” between independent and major label artists and it’s forever changed the way in which recording artists and labels operate.

“Artists are at a point where they realize going back to the old model doesn’t make any sense. There is a hunger for a new way of doing things.”—Brian Message, Manager, Radiohead. New York Times, July, 2009.

Producer Advance (Old School)

The record company advances producer a “fee” on behalf of the Artist and then pays all recording costs. The advance will be determined largely on the success of producer’s earlier recordings.

According to attorney and author Donald Passman:

“C” List/New Producers: \$0 to \$2,500/\$3,500 per track (\$25,000 to \$35,000 per LP)

“B” List/Mid-Level: \$3,500 to \$7,500 per track (\$35,000 to \$75,000 per LP)

“A” List/Superstar: \$10,000 plus (more like \$50,000 plus per track)

“All-in” Producer Fund (Most Cases)

Digidesign’s Pro Tools has revolutionized the way in which music is created. With the emergence of Pro Tools, most producers have their own recording studios. Producer gets an *All-In Fund*: Producer’s fee *plus* recording costs. We are in a *producer-heavy* period.

“C” List: On “spec” or flat fee for a bunch of tracks (i.e., \$5,000 for 6 songs)

“B” List: On “spec” or flat fee from \$5,000 to \$25,000 per track

“A” List: On “spec” or from \$50,000 to \$150,000 per track

Most “A” list producers do not produce tracks on “spec” or based on speculation of a song’s future success.

Remixer: Creates all new music (or a “remix” of a song). Fee is usually very high because the remixer knows there are no points available (unless the original Producer agrees to a royalty *reduction* in the event artist brings in a remixer).

“In the beginner’s mind there are many possibilities; in the expert’s mind, there are few.”—Suzuki Roshi, Zen Buddhist teacher

Planning is learning to read the pulse of the business. However, small business owners are impatient. They want to get on with running the business and do not have or make time to write the business plan. Often they are intimidated or they simply procrastinate. It is true that some successful small businesses can start without any thought to planning and manage by reaction. However, once the business starts to get complicated, finding solutions can become confusing and a business plan can really help sort out the options, opportunities and problems—ahead of time.

What Is a Business Plan?



DVD: Studio-Side Chat
Business Plan versus
Marketing Plan: 14:44–16:32

Simply, a business plan is a written, objective analysis of the business *before* you actually build it. It is a roadmap, a blueprint for how to start it. It is your best attempt at predicting your future reality—a good plan will prepare the owner to take advantage of opportunities as they occur and to deal with problems by anticipating them in advance.

The primary purpose of a business plan is in the process itself. Writing a business plan forces you to be objective and critical about your vision. It helps you identify weaknesses and opportunities, suggests benchmarks to mark any progress and gives you confidence that you should (or should not!) continue to build this business.

There are other important reasons. The plan becomes an operational management tool that can be used to manage your ongoing business. It is also a means of communication to others about your business—partners, supporters, customers and friends. Finally, if appropriate, it can be used to raise capital for the business.

The business owner, owners or key management should write this plan. Only you have the unique perspective needed to understand the business you’re trying to create and whether, in the end, it’s going to be worth it. Of course you may need help or assistance from a professional, but the responsibility of creating the plan must remain with the business owner. If