

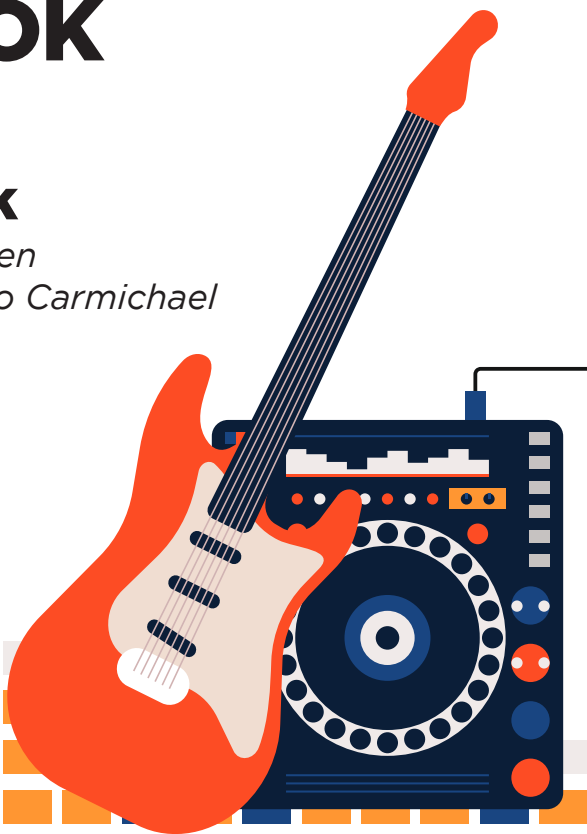
# THE MODERN MUSIC THEORY HANDBOOK

**by Nathan Park**

*Foreword by Reuben Allen*

*Contributions by Yukihiro Carmichael*

**PROJECT** 



# Introduction

Welcome to the Modern Music Theory Handbook! This brief but thorough guide will cover the basics of music theory, including reading and composition, and is designed to make music theory more engaging, relevant, and useful for young aspiring musicians and producers.

Let's be honest, traditional music theory workbooks and textbooks are lengthy, dense, and a bit dry. This handbook brings the fundamentals of music theory to life through the incorporation of contemporary music, particularly in the genres of hip hop and pop. From dissecting popular hip hop tracks like "HUMBLE." by Kendrick Lamar to iconic pop tracks like "Happy" by Pharell Williams, musicians will learn crucial music theory knowledge that will help them develop their own skills in production, songwriting, and composition.

This handbook bridges the gap between practice and interactivity, ensuring that readers learn the essentials of music theory through modern examples and interesting exercises.

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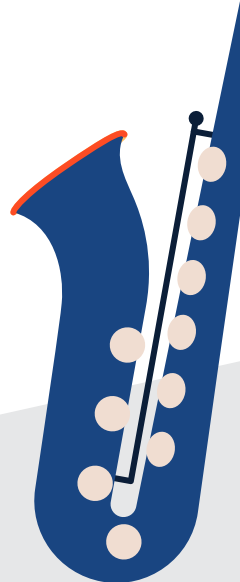
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# Foreword by Reuben Allen

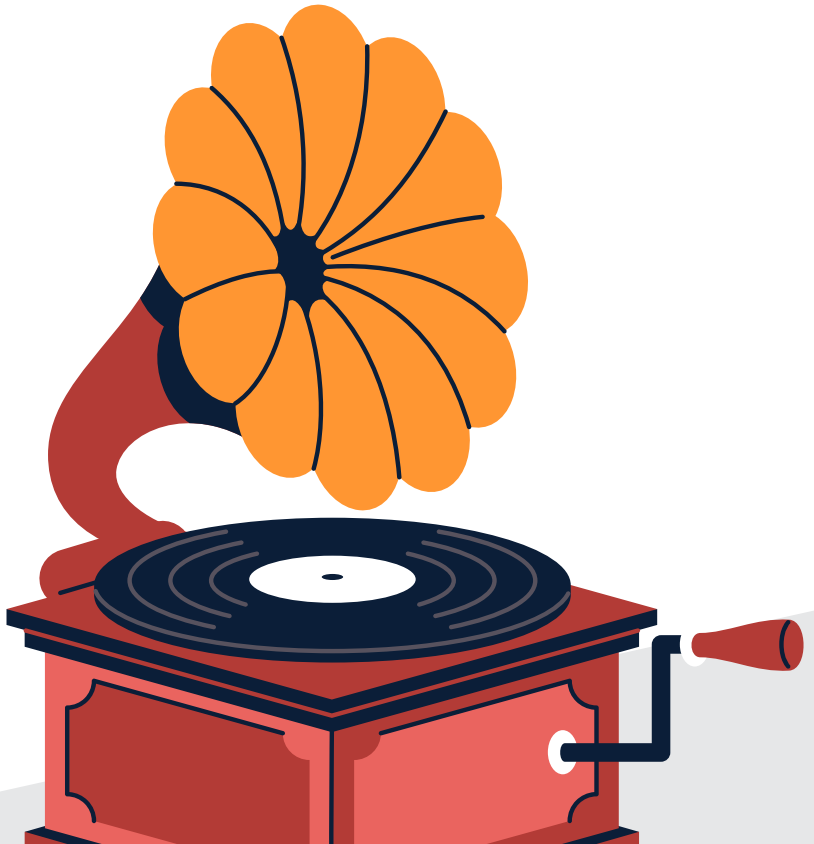
## *Jazz Piano and Arranging Instructor at The Juilliard School of Music*

The study of music theory should not be a boring and dry endeavor. Instead, the process can inspire a joyful lifelong study of connection between the systems of theory, the shapes and fingerings on our instruments, and the sounds and musical vocabulary we know and love. When students build a strong foundation in music theory in tandem with the development of aural skills, they can learn to read and interpret written music as if reading from a book in their native language. Rather than becoming overwhelmed by hundreds of dots, stems, and rests, students can learn to comprehend groups of symbols as familiar rhythmic patterns, melodic motifs, phrases, chords, and progressions.

Eventually, students can learn to recognize these elements by ear (even on a first listen) as if hearing and understanding a story told in the moment. With enough study and practice, students can even learn to frame pre-existing pieces in a personal way through the crafts of orchestration and arranging, invent their own musical pieces over time through composition, and even improvise original statements in the spur of the moment through improvisation. Bach, Mozart, Chopin, Debussy, Louis Armstrong, Duke Ellington, Bill Evans, Carole King, and Stevie Wonder were masters of improvisation who took the time to record their most poignant ideas so that we know them as classics today.

No matter what style of music you hope to explore, with these tools and skills, you too can learn to understand, write, and speak in the language of the musical styles that you love most.

# BASIC REVIEW



## Staff Review



**Staff:** The staff is made up of horizontal lines and spaces where notes are placed. There are five lines and four spaces, all representing different pitches.



**Clef:** Clefs indicate the pitch of notes and are drawn at the beginning of the staff. The most common clefs are treble clef and bass clef. Treble and bass clef are both used to indicate the pitch of notes in sheet music. They are drawn at the beginning of the staff and set the range of pitches that the staff represents.



### Treble Clef

- Also known as the G clef.
- Drawn on the second line of the staff.
- Indicates higher-pitched notes.
- The spiral portion of the clef circles the line representing the note G.

To remember the notes in treble clef, refer to the following mnemonics:

- Lines (from bottom to top): E, G, B, D, F (mnemonic: Every Good Boy Does Fine).
- Spaces (from bottom to top): F, A, C, E (mnemonic: FACE).



### Bass Clef

- Also known as the F clef.
- Drawn on the fourth line of the staff.
- Indicates lower-pitched notes.
- The two dots in the clef surround the line representing the note F.

- Also known as the F clef.
- Drawn on the fourth line of the staff.
- Indicates lower-pitched notes.
- The two dots in the clef surround the line representing the note F.

To remember the notes in bass clef, refer to the following mnemonics:

- Lines (from bottom to top): G, B, D, F, A (mnemonic: Good Boys Do Fine Always).
- Spaces (from bottom to top): A, C, E, G (mnemonic: All Cows Eat Grass).

When two clefs are used simultaneously, they form a grand staff, allowing for a wider range of pitches.



**Notes:** Notes are symbols that represent pitches. They can be placed on lines or spaces on the staff. The pitch of a note is determined by what line or space it is on. A note's pitch changes when switching clefs.



**Lines and Spaces:** Lines and spaces on the staff represent different pitches. Like notes, these pitches depend on the clef.



**Time Signature:** Time signatures are made up of two numbers placed at the beginning of the staff. These numbers are stacked on top of each other and indicate the number of beats in a measure and the type of note that counts as one beat. Some examples are 4/4 (four beats per measure, with one beat equalling a quarter note) and 3/4 (three beats per measure, with one beat equalling a quarter note).



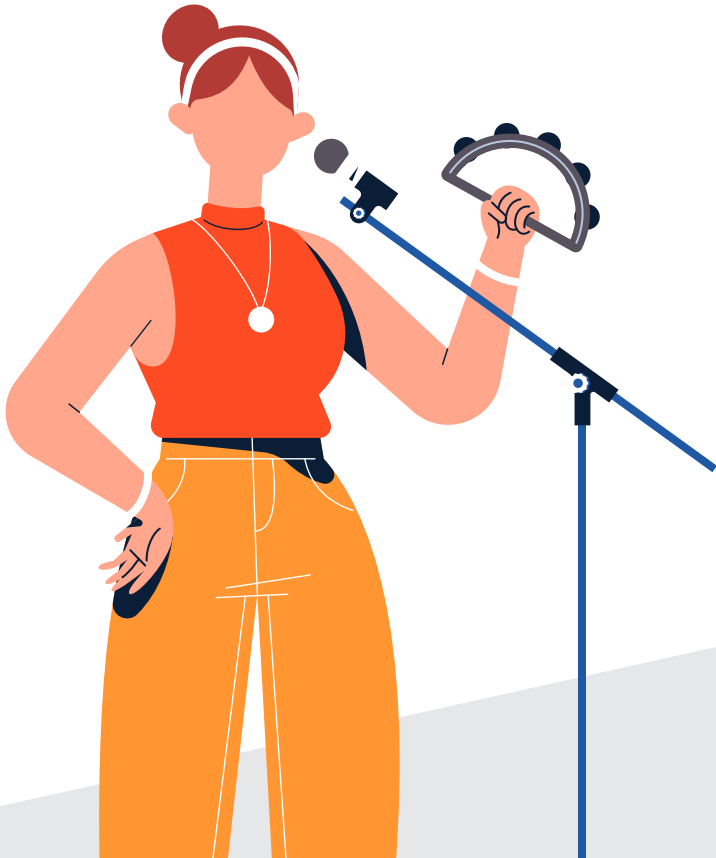
**Bar Lines:** Bar lines are vertical lines that section the staff into measures. Measures organize segments of music, and the length of a measure is determined by the time signature.



**Ledger Lines:** Ledger lines are used to indicate pitches above or below the staff. They are short lines drawn parallel to the staff. Notes written on ledger lines follow the same principles as those on the staff.



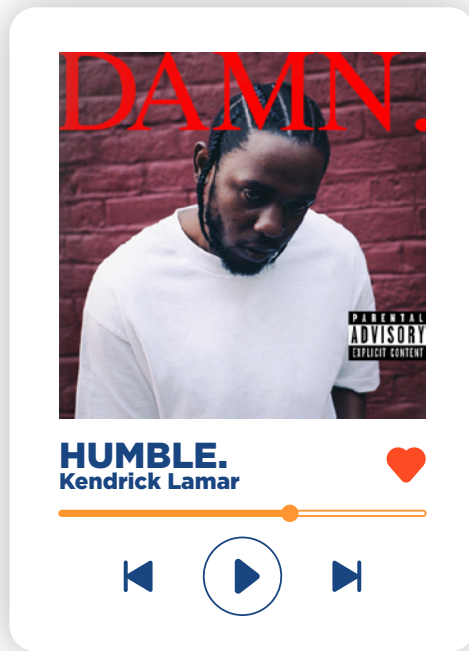
**Rests:** Rests are symbols that indicate silence in music. Each rest symbol corresponds to a specific duration of time, similar to notes.





# NOTES AND RHYTHMS





**LISTEN NOW**  
<https://www.youtube.com/watch?v=tvTRZJ-4Eyl>



## Notes + Rests

There are many different types of notes, all with different symbols and durations. Whole notes last for an entire measure and are symbolized by a hollow oval. In 4/4, for example, they are equal to 4 beats. In 3/4, they are equal to 3 beats. Half notes last for 2 beats and are drawn as a hollow oval with a stem attached. Quarter notes last for 1 beat and are represented as a filled-in oval with a stem. Eighth notes last for half a beat and are drawn like quarter notes but with a flag attached to the stem. Sixteenth notes last for a quarter of a beat and are drawn like eighth notes but with two flags. As a note becomes smaller, more flags are attached to its stem. However, notes smaller than a sixteenth note are rarely used.

Rests are used to represent silence in music. Whole rests indicate a full measure of rest and are drawn as a rectangle hanging from the fourth line. Half rests represent 2 beats of silence and are drawn as a rectangle on top of the third line. Quarter rests represent 1 beat of silence, and are drawn like lightning bolts. Eighth and sixteenth rests follow the same patterns as their note counterparts, adding an additional mark to their stems as they get smaller.

Additionally, a dot can be added to any note or rest. A dot adds half the value of the original note or rest onto itself. For example, a normal half note is equal to 2 beats. A dotted half note would be equal to 3 beats, as half the value of a normal half note is 2 beats.



## Measures

Measures, or bars, are segments of notes enclosed by two vertical lines. These vertical lines, called bar lines, indicate the beginning and end of a measure. Double bar lines are used to notate the end of a section or completed piece. Repeat signs, drawn like double bar lines but with two dots, are used to repeat a section of music. Typically, bars are numbered to help musicians refer to specific spots in the music. Measures are also incredibly important in constructing musical phrases. Musical phrases, or motifs, help structure a piece, and often span across many measures.



## Note Stems

Note stems, seen in quarter notes, eighth notes, and sixteenth notes, can have varying directions depending on various factors in a piece of music. Here is a general checklist for determining the proper direction for a note stem:

- 1 **Direction:** Stems can point up or down, depending on the placement of the note on the staff.
  - Notes below the third line have stems pointing up.
  - Notes on the third line can be either up or down.
  - Notes above the third line have stems pointing down.
- 2 **Exceptions for Middle Line:** Note stems on the third line are often decided by context. Often, if notes before and after the note on the middle line face a certain direction, the note on the middle line will follow suit.

- 3 Connected Stems:** Multiple consecutive eighth or sixteenth notes are often connected by beams, lines attaching all the stems together. The stem direction of these grouped notes are determined by the outermost note directions.

## Time Signatures

Time signatures are used to indicate how many beats are in each measure and what type of note counts as one beat. Common time signatures you may see include 4/4, 3/4, 2/4, and 6/8. There are two types of meter: simple and compound.




Simple meter refers to time signatures in which beats can divide into two. 2/4, 3/4, and 4/4 are all examples of simple meter. In 2/4, for example, there are two beats per measure, with each beat able to divide into two equal parts. The top number of the time signature indicates the number of big (or strong) beats, while the number on the bottom indicates the big beat's unit.

Compound meter refers to time signatures in which beats can divide into three equal parts. 6/8, 9/8, and 12/8 are all examples of compound meter. In 6/8, for example, there are six beats per measure, all able to divide into groups of three. The top number of the time signature indicates the number of small beats, which are grouped into three to form large beats. Because in compound meter the small beats are grouped in threes, the big beats will always be written with a dot. Using the 6/8 example, big beats in this time signature are written as dotted quarter notes.



## Basic Exercises

- 1 Write the name and amount of beats each note/rest has

| NAME                 | NOTE  | REST  | LENGTH               |
|----------------------|---|---|----------------------|
| <input type="text"/> | <input type="text"/>  |  | <input type="text"/> |
| <input type="text"/> |  | <input type="text"/>  | <input type="text"/> |
| Quarter              | <input type="text"/>  | <input type="text"/>  | <input type="text"/> |
| <input type="text"/> | <input type="text"/>  | <input type="text"/>  | 1/2                  |
| <input type="text"/> |  | <input type="text"/>  | <input type="text"/> |

- 2 Number the beats in the measures



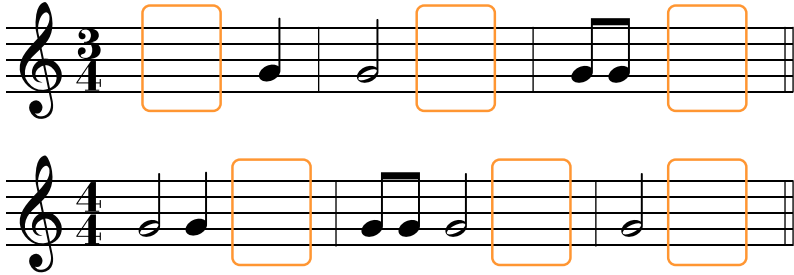
1 2 3-4



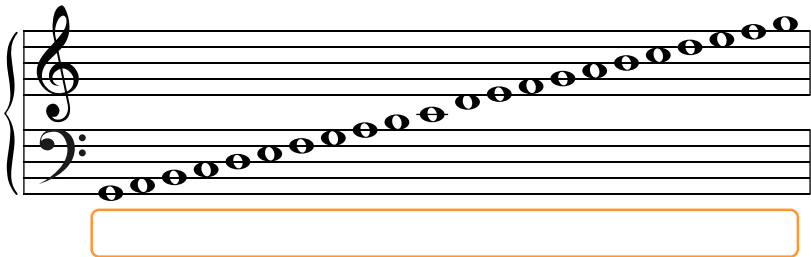
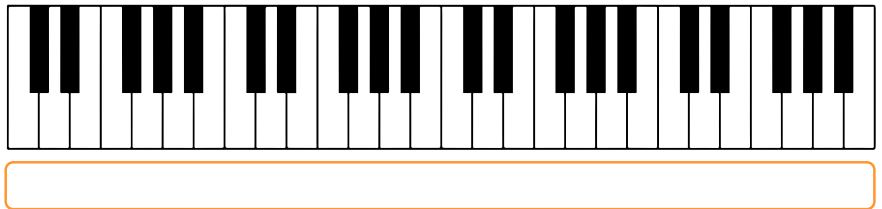
- 3 Draw measure lines dividing each beat



- 4 Add one note or rest to complete the measure



- 5 Write out the names of the white key notes under the piano:



## 6 Add stems to the notes



Following exercises are based on **HUMBLE.** by Kendrick Lamar

## Exercise 1: Rhythmic Notation

**Objective:** Learn about common drum patterns in popular music. Which one is your favorite?

- ✓ **Four-on-the-Floor:** This drum pattern is used in dance, EDM, disco, pop, and rock music. It creates a steady rhythm by having a kick, 808, or bass hit on every beat.
- ✓ **Boom Bap:** This drum pattern is used in hip-hop, specifically old-school/90's hip-hop. The name comes from the sounds that the drums make in this pattern- the “boom” represents the kick sound and the “bap” represents the snare sound. The kick hits on beats 1 and 3 while the snare hits on 2 and 4.
- ✓ **Trap Beat:** This drum pattern is used in rap and modern hip-hop. It features repeating sixteenth note hi-hats along with kick drums and claps hitting on similar beats as the Boom Bap pattern.
- ✓ **Rock Backbeat:** This drum pattern is used in rock music, featuring heavy snares on beats 2 and 4 and a kick drum on all 4 beats. The rock backbeat creates a powerful, energetic rhythm.
- ✓ **Shuffle Groove:** This drum pattern was popularized in jazz music and is also used in rock and pop. The highlight of the shuffle groove is the triplet rhythm, with snares hitting on the second and third beats of each triplet group. To round off the pattern, a kick drum plays steadily to create a swinging feeling.

## Exercise 2: Verse Structure

**Objective:** Transcribe the piano melody from bass clef to treble clef and focus on writing the correct stem directions.

## Exercise 3: Time Signature

**Objective:** Learn about syncopation and practice notating syncopated rhythms.

- ☆ Syncopation is the technique of altering the placement of beats or accents in music, so that normally emphasized beats are shifted to less emphasized positions and vice versa.
- ✓ Observe the notated rhythm from Exercise 2: Verse Structure. Identify and circle the syncopated note.
- ✓ How does syncopation make rhythms more interesting? Can you think of any other examples of syncopation throughout the song?



## Exercise 4: Transition Between Sections

**Objective:** Explore how the song transitions between sections by notating changes in rhythm or dynamics.

- ☆ Dynamics in music refer to volume and how softly or loudly something should be played. From quietest to loudest, the common dynamic markings are: pianissimo (pp), piano (p), mezzo piano (mp), mezzo forte (mf), forte (f), and fortissimo (ff).
- ✓ Identify one point where the song transitions between different sections.
- ✓ Listen for any dynamic shifts during this transition. What do you hear? How does Kendrick use dynamics to make the song more interesting?

## Exercise 5: Notating Rhythmic Patterns

**Objective:** Identify and notate repeated rhythms throughout the entire song.

- ✓ Identify a section in the song with a repeated musical motif, such as a recurring bass line or drum pattern.
- ✓ Notate the rhythm and time signature on the empty staff below. Do not worry about transcribing the pitches of each note- simply write the rhythmic values.



- ✓ Now, try clapping the notated rhythm! See if you can maintain a steady rhythm while clapping.

# ACCIDENTALS





## SICKO MODE

Travis Scott



LISTEN NOW

<https://www.youtube.com/watch?v=d-JBBNg8YKs>



## Accidentals

### Sharps, Flats, Naturals

Accidentals are symbols used to alter the pitch of a note. The three different accidentals are sharps (#), flats (b), and naturals (♮).

- 1 **Sharps (#):** Sharps raise notes by one half step, or one semitone.
- 2 **Flat (b):** Flats lower notes by one half step or semitone.
- 3 **Natural (♮):** Naturals cancel out both key signatures and other accidentals preceding its marked note.
- 4 **Double Sharp (𝄌):** Double sharps raise notes by two half steps, or a whole step. They are not used very often.
- 5 **Double Flat (𝄍):** Double flats lower notes by two half steps, or a whole step. They are also not used very often.

Accidentals are marked to the left of the note they are on, and they only affect that specific pitch within a measure. Accidentals also only last for the measure they are in. Remember that naturals cancel out sharps and flats, so if a natural is placed after one, repeating notes after will not be raised or lowered. Accidentals only apply in the octave in which they are introduced. For example, if middle C has a sharp in a particular measure, all C's an octave above or below it do not automatically receive a sharp within that measure.

Key signatures are essentially “permanent accidentals” that apply to the entire length of a given piece, unless the key signature is changed. In the key of G major, for example, there is only one sharp (F#). If you wanted to notate an F natural, you would need to use a natural symbol.



## Semitones and Whole Tones

Semitones and whole tones describe the distances between different pitches.

- 1 Semitones (Half Steps):** Semitones are the smallest intervals in music and represent the distance between two adjacent keys on a piano.
- 2 Whole Tones (Whole Steps):** Whole tones are equal to two semitones, and in terms of a piano, is equivalent to skipping one key.



## Basic Exercises

### 1 Practice drawing sharps and flats



C C# D D# F F# A A#



B B $\flat$  D D $\flat$  G G $\flat$  A A $\flat$

### 2 Name each note and its enharmonic equivalent

A# →

E# →

B# →

D $\flat$  →

G $\flat$  →

F $\flat$  →

### 3 Practice drawing natural symbols

D# D A# A C $\flat$  C

B# B F $\flat$  F G $\flat$  G

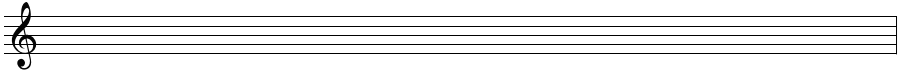
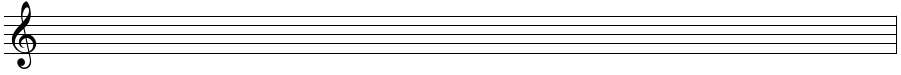
Following exercises are based on **SICKO MODE** by Travis Scott

## Exercise 1: Identifying Accidentals in the Intro

**Objective:** Rewrite accidentals used in the melody of the song's intro

- ✓ Listen to the intro of “SICKO MODE” and then read the notated version below. Notice how chaotic and messy the staff is! Rewrite the melody below in the key of G minor using a key signature (refer to chapter three for more info on key signatures). You will have to rewrite some notes as their enharmonic equivalents.

Ex. The first A# can be rewritten as B♭



## Exercise 2: Analyzing Harmonic Changes in the Transition

**Objective:** Explore how accidentals contribute to harmonic changes during transitions between sections.

<https://youtu.be/7H5sB9i5sgc>

- ✓ Identify the point where the song transitions from Part 1 to Part 2.
- ✓ Pay attention to the use of accidentals. How do accidentals heighten and relieve tension during the transition? Write a short response below.

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## Exercise 3: Outro Resolution

**Objective:** Observe the use of accidentals in the outro of the song.

- ✓ Pay attention to the outro of the song.
- ✓ Identify any instances of sharps, flats, or naturals in the closing moments.
- ✓ Analyze how these accidentals contribute to the resolution or add surprises to the song's conclusion.

## Exercise 4: Chord Intervals

Consider the following chord progression from Travis Scott's SICKO MODE:

**Cm9, Bbmaj7, Ebmaj7 and Db9**

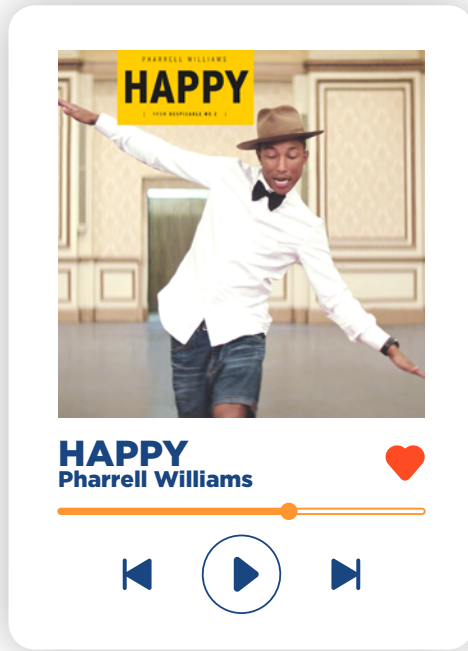
Research and then write out these four chords on the empty staff below. Then, in terms of semitones and whole tones, find the distance between each note in their respective chords. Determine the overall tonality of the excerpt. Is it more characteristic of a major or minor key?





# KEYS AND SCALES





**LISTEN NOW**  
<https://www.youtube.com/watch?v=tvTRZJ-4Eyl>



## Key Signatures

Key signatures are placed at the beginning of a staff and indicate what notes have sharps or flats in a piece. Think of key signatures as a set of permanent accidentals. Every major key has a relative minor. Relative minors share the same key signature as their major counterpart.

- 1 **C Major / A Minor:** No sharps or flats
- 2 **G Major / E Minor:** One sharp (F#)
- 3 **D Major / B Minor:** Two sharps (F#, C#)
- 4 **A Major / F# Minor:** Three sharps (F#, C#, G#)
- 5 **E Major / C# Minor:** Four sharps (F#, C#, G#, D#)
- 6 **B Major / G# Minor:** Five sharps (F#, C#, G#, D#, A#)

- 7 **F# Major / D# Minor:** Six sharps (F#, C#, G#, D#, A#, E#);
- 8 **C# Major / A# Minor:** Seven sharps (F#, C#, G#, D#, A#, E#, B#)
- 9 **F Major / D Minor:** One flat (B $\flat$ )
- 10 **B $\flat$  Major / G Minor:** Two flats (B $\flat$ , E $\flat$ )
- 11 **E $\flat$  Major / C Minor:** Three flats (B $\flat$ , E $\flat$ , A $\flat$ )
- 12 **A $\flat$  Major / F Minor:** Four flats (B $\flat$ , E $\flat$ , A $\flat$ , D $\flat$ )
- 13 **D $\flat$  Major / B $\flat$  Minor:** Five flats (B $\flat$ , E $\flat$ , A $\flat$ , D $\flat$ , G $\flat$ )
- 14 **G $\flat$  Major / E $\flat$  Minor:** Six flats (B $\flat$ , E $\flat$ , A $\flat$ , D $\flat$ , G $\flat$ , C $\flat$ )
- 15 **C $\flat$  Major / A $\flat$  Minor:** Seven flats (B $\flat$ , E $\flat$ , A $\flat$ , D $\flat$ , G $\flat$ , C $\flat$ , F $\flat$ )



## Intervals

Intervals are the differences between two pitches. Along with a numerical distance, intervals can be categorized by different qualities: perfect, major, minor, augmented, and diminished.

Here is a description of each quality:

- 1 **Perfect Intervals (P):** Perfect intervals indicate stable sounds and are consonant, complementing each other well tonally.
- 2 **Major Intervals (M):** Major intervals indicate bright sounds and are also relatively consonant.
- 3 **Minor Intervals (m):** Minor intervals indicate dark, melancholy sounds and are often used to build tension.

Here is a list of every common interval:

- 1 **Unison (P1):** The interval between two identical pitches.
- 2 **Minor Second (m2):** One semitone above or below a given pitch.
- 3 **Major Second (M2):** Two semitones above or below a given pitch.
- 4 **Minor Third (m3):** Three semitones above or below a given pitch.
- 5 **Major Third (M3):** Four semitones above or below a given pitch.
- 6 **Perfect Fourth (P4):** Five semitones above or below a given pitch.
- 7 **Augmented Fourth / Diminished Fifth (A4/d5):** Six semitones above or below a given pitch.
- 8 **Perfect Fifth (P5):** Seven semitones above or below a given pitch.
- 9 **Minor Sixth (m6):** Eight semitones above or below a given pitch.
- 10 **Major Sixth (M6):** Nine semitones above or below a given pitch.
- 11 **Minor Seventh (m7):** Ten semitones above or below a given pitch.
- 12 **Major Seventh (M7):** Eleven semitones above or below a given pitch.
- 13 **Perfect Octave (P8):** Twelve semitones above or below a given pitch.



## Scales

Scales are a series of ordered pitches, composed of patterns of whole tones and semitones (or half tones). They are used to create melodies, chords, and overall harmonies. They are essential to composition and form the base for every piece of music.

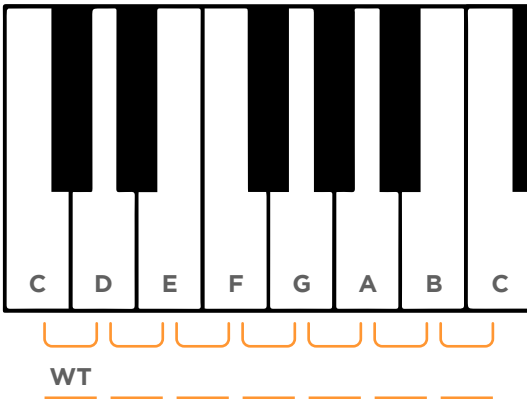
Here are the parts that make scales:

- 1 **Tonal Steps:** Scales are built from patterns of tonal steps. These steps include whole tones (W) and half tones (H).
- 2 **Octave:** An octave is the distance between two pitches of the same letter name. Scales span across an entire octave.
- 3 **Major Scale:** Major scales follow a specific pattern of whole and half steps: W-W-H-W-W-W-H. Major scales are associated with happy sounds.
- 4 **Minor Scale:** Minor scales follow a specific pattern of whole and half steps: W-H-W-W-H-W-W. Minor scales are associated with dark, melancholy sounds.
- 5 **Chromatic Scale:** The chromatic scale is a scale made up of every single pitch in an octave. The pattern of a chromatic scale is made entirely of half steps. Chromatic scales are used to build tension.

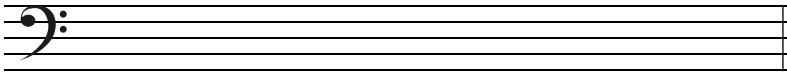
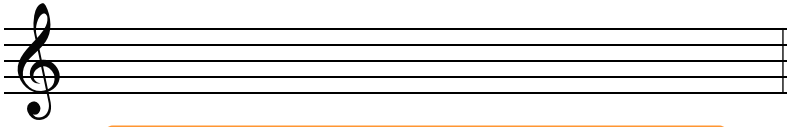


## Basic Exercises

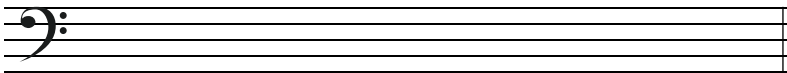
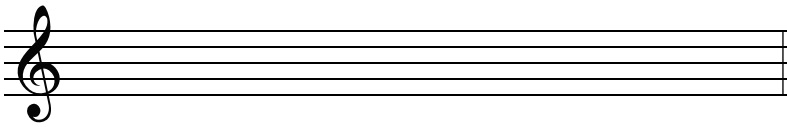
Mark the Whole Tones and Half Tones on a C major scale



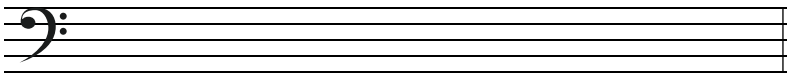
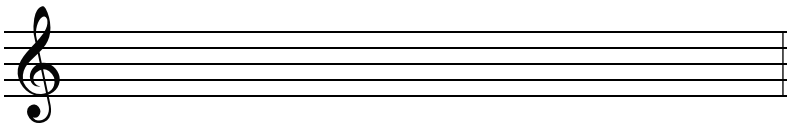
Write a C major scale in treble and bass clef below.



Write a G major scale in treble and bass clef below, using accidentals.



Write an E minor scale in treble and bass clef below, using accidentals.



Following exercises are based on *Happy* by Pharrell Williams

## Exercise 1: Key Signatures in "Happy"

**Objective: Understand the key signature of F major.**

- ✓ Identify the key signature of F major.
- ✓ Write out the F major scale on the empty staff below, making sure to include the clef symbol and key signature. How does the major key influence the overall tonality of the song?

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## Exercise 2: Use of Intervals

**Objective: Recognize the use of intervals in the melody of "Happy."**

- ✓ Identify common intervals found in the major key of F major and write three of them out in the empty staff below.

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- ✓ In the space below, briefly write how these intervals contribute to the song's melodic character and mood.

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## Exercise 3: Backing Vocals and Harmonies

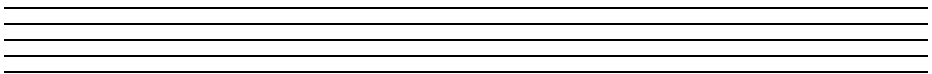
**Objective: Examine how backing vocals and harmonies complement the main melody.**

- ✓ Listen to the backing vocal harmonies in “Happy.” The melody of these vocals is C, A#, A#, A♭. Identify the intervals between these notes and F, the starting note (or tonic) of the F major scale.
- ✓ Bonus: Try creating your own harmony that would complement the “Happy” melody!

## Exercise 4: Transposition Exercise

**Objective: Reinforce understanding of keys and scales through transposition.**

Try transposing the main melody of “Happy” to a new key.





## Bridging the Simple and Complex: Finding Inspiration, Meshing Genres, and Japanese Train Signs

*The following lesson is based on a video deconstruction of “Fang,” an instrumental featured in Netflix’s Dr. Stone. Composed by Professor Yukihiro Carmichael from the Berklee College of Music, this lesson will give insight into how professionals approach creating music for media. The full deconstruction video can be found on the Project EQ website, or by scanning the QR code below.*



*Written by Nathan Park & Yukihiro Carmichael*

The music featured in Netflix’s **Dr. Stone** perfectly matches the show’s unique blend of adventure, science, and humor- it’s high-energy, inspiring, and eclectic. From the complicated rhythms and unconventional instruments to the mix of stylized drum breaks, Dr. Stone’s music perfectly complements and amplifies every scene. In this short lesson, Yukihiro Carmichael breaks down his entire composition process, from finding initial inspiration to putting the finishing touches on the final mix.

*Music theory definitions are underlined, while music production definitions are **bolded**.*



## Note Selection

A great composition always starts with intentional sound selection. Professor Carmichael decided to use cluster harmonies inspired by traditional Japanese koto music. Cluster harmonies are chords comprising at least three adjacent notes from a scale. These harmonies create dissonance, as these adjacent notes clash with each other to produce an unusual sound. This technique can be used to create tension or a feeling of uneasiness. In this particular composition, Professor Carmichael uses the notes G, C, C#, and F as a base for his scale.

**Theory In Use:** Professor Carmichael takes inspiration from the Hirajōshi scale, a traditional tuning pattern of the Japanese koto. The koto is the national instrument of Japan, dating back to as early as the third century BC. The Hirajōshi scale follows a pattern of intervals, with a structure of 2-1-4-1-4 semitones. Almost all traditional koto music is composed in this mode, or scale.

**Dr. Stone** is a Japanese anime that takes place in a post-apocalyptic world where most of humanity has turned to stone. Using science and innovation, the main character Senku must reinvent basic tools and technology to help save the world. The use of the Hirajōshi scale grounds the show, referencing themes of rural Japan while also evoking a sense of wonder and exploration.

**Composition Tip #1:** It is useful to confine yourself to using only a couple of notes in a scale. Often, producers and composers overcomplicate their music and insert “artificial complexity” by creating difficult rhythms or massive chords. However, if you start off by picking specific notes that match the tone and goals of your composition, your final product will be extremely effective in reflecting the mood and emotions you intended for.

Professor Carmichael also takes inspiration from his surroundings when crafting unique voicings. For a build-up section, he incorporated the distinctive jingle of Japanese train signals, which are specifically designed to be attention-grabbing and alert commuters of an approaching train. He transposed the sound of the jingle into notes, playing these melodies on sharp kotos and harsh violins. Through this unique approach to composition, Professor Carmichael is able to create a tension-filled atmosphere with different, but recognizable sounds.



## Sound Selection

One of the overarching themes of **Dr. Stone** is innovation— Senku must essentially recreate all of modern society from scratch. Professor Carmichael was careful to keep the source material in mind while composing. He made sure to blend traditional sounds and melodies with modern instrumentation, opting to layer an electric guitar riff over his koto melodies. This overdriven and distorted melody is the most recognizable part of the composition, and is the main motif that the instrumental always returns to. A motif is a musical idea or phrase that recurs throughout a piece.

This climactic start to the composition was also aided by various drum breaks and loops. Professor Carmichael started by recording taiko drums, creating a more dramatic atmosphere. Taiko drums are a set of traditional Japanese percussion instruments, dating back over 2000 years. His use of these drums, along with simple rhythms, reinforces the progression of **Dr. Stone**. Just like Senku has to slowly create increasingly complicated inventions, he starts his composition with the most basic form of percussion and slowly layers more complicated rhythms over time.

**Composition Tip #2:** Contrast is extremely important in creating interesting and memorable music. Combining notes and rhythms in unique ways can breathe fresh life and energy into a composition. Experiment with mixing seemingly unrelated textures in your next song, and see if it leads to any interesting outcomes!

On top of the taiko drums, Professor Carmichael layers modern **drum and bass** percussion breaks. Drum and bass is a genre of music that samples and splices aggressive drum chops to create high-energy, rhythmically driven compositions. Using a plug-in called **bitcrusher**, he was able to bring out the mid and high frequencies of the drums to produce a clear and “noticeable” sound. Especially with the many instrumental layers on top, Professor Carmichael wanted to ensure that the percussion could be identified. He also layered classic rock drums playing a simple rhythmic pattern to add more clear direction and stability to his composition.

**Theory in Use:** A musical strata is a group of sounds or rhythms that work together to create an overarching texture. Professor Carmichael uses sounds that, while simple by themselves, are complicated once meshed together cohesively. Strata are useful especially in compositions for film and television. Because film music often takes the backseat to character dialogue and action on screen, “sneaking” in complexity by layer sounds rather than making over complicated melodies is a useful technique to utilize.



## The Demo Versus the Final Mix

The composition process involves many revisions— studios and companies often ask musicians to create multiple demo mixes before starting on the final product. So, what is the difference between a demo mix and final mix?

In the full video deconstruction with Professor Carmichael, we dissect both his first demo and his final product. The demo mix is often characterized by the use of **MIDI** instruments, a generally chaotic layout, and imperfectly balanced sounds. MIDI stands for Musical Instrument Digital Interface, and is a way of replicating notes digitally without having to play physical instruments. It is the primary way of creating instrumental sounds in popular music, specifically Hip-Hop and Pop.

In the demo mix for Fang, Professor Carmichael shows how most of his orchestral instruments were simply MIDI notes, generated in his **DAW**. DAW stands for Digital Audio Workstation, and these programs allow users to record, edit, produce, and mix music. They are the most convenient way for digital music producers to organize and create compositions. Some popular DAWs include: FL Studio, Ableton, Pro Tools, Cubase, and much more.

Generally, the demo mix is also more cluttered and unorganized. Because you can always take away instruments and sounds, it is helpful to simply put all your ideas out into the composition during this phase of production.

After a demo mix is approved, producers send their project files to a **mixing engineer** in order to create a final mix. Mixing engineers are tasked with balancing the track, polishing sounds, and adding final touches. Their work involves adding effects like **reverb**, which can make instruments sound wider and expansive, as well as **panning** sounds, or shifting the positioning of noises relative to the listener. For his final mix, Professor Carmichael replaced many of his MIDI instruments with live recordings. Elements such as drums, guitars, and traditional Japanese instruments were all replicated with live players, bringing more life into the entire composition.

For more, check out the full deconstruction video through the scannable QR code!

# Conclusion

This concludes the Project EQ Modern Music Theory Handbook! With your new understanding of the music theory basics, you can now create your own compositions and deeply analyze your favorite music. For more music theory assistance, interviews with industry professionals, and general resources, please visit the Project EQ website ([projecteq.org](http://projecteq.org)).



# HANDBOOK ANSWER KEY

## UNIT 1



# Basic Exercises

1

**NAME**      **NOTE**      **REST**      **LENGTH**

|           |  |  |     |
|-----------|--|--|-----|
| Whole     |  |  | 4   |
| Half      |  |  | 2   |
| Quarter   |  |  | 1   |
| Eighth    |  |  | 1/2 |
| Sixteenth |  |  | 1/4 |

2



1 2 3 (4)      1 (2, 3) 4



1 (2) 3 +      1 (2, 3)      1 + 2 (3)



3

4

5

C, D, E, F, G, A, B, C, D, E, F, G, A, B, C, E, D, F, G, A, B, C, D, E, F, G, A, B

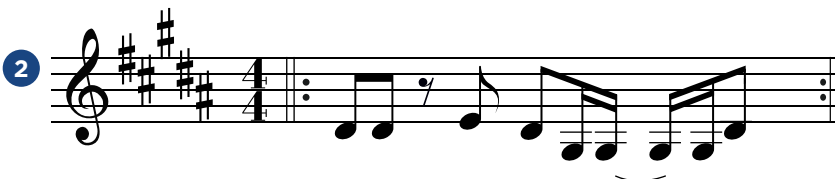
G, A, B, C, D, E, F, G, A, B, C, D, E, F, G, A, B, C, D, E, F, G

6

# SONG EXERCISES

*Answers may vary*

- 1 My personal favorite is the Boom Bap rhythm, but any answer is correct!



**B** Syncopation disrupts a listener's expectations by stressing off-beats. This creates a sense of variation and groove, which can lead to more attention-grabbing and unique rhythms. Syncopation helps songs feel less cookie-cutter and more personalized and thought-out. The kick drums in the song contain notable syncopation, as they regularly hit on the off-beats.

- 4 **A** The song transitions from the first verse to the chorus at 0:58.

**B** In the first verse, the piano melody is played quietly and in one octave only. When the energetic chorus starts, the piano increases in volume and is played in two octaves. Kendrick uses this shift in dynamics to show listeners that the chorus is the most important and memorable part of the song. Another interesting section is at 1:05, when the instrumental cuts out briefly. This is used to add variation to the semi-repetitive beat, while also emphasizing Kendrick's rap vocals. In this way, dynamics are used to add variation and emphasis to different parts of the track.

- 5 **A** The beginning of the song's first verse features a repeating kick drum pattern.





# Basic Exercises

1

2

|           |   |           |
|-----------|---|-----------|
| A#        | → | B $\flat$ |
| E#        | → | F         |
| B#        | → | C         |
|           |   |           |
| D $\flat$ | → | C#        |
| G $\flat$ | → | F#        |
| F $\flat$ | → | E         |

3

# SONG EXERCISES

1

- 2 **A** The song transitions from Part 1 to Part 2 at 1:00.
- B** The clash of accidentals highlights the surprise of the sudden beat drop. Accidentals are used to create and release tension, often forming unexpected and unique chords. Paired with the repeating snare drums, the accidentals are a key element to the compelling production of SICKO MODE in this section.
- 3 This exercise was a trick question. There is a noticeable lack of accidentals in the outro to “SICKO MODE”... and this was intentional. Resolution comes from moving from a dissonant, or harsh, sound to a consonant, or stable, sound. The end of “SICKO MODE” feels complete because there are no accidents deviating from the key. It allows listeners to subconsciously realize the song is coming to a close.

4

Cm9 : minor third, perfect fifth, minor seventh, major ninth

B $\flat$ maj7 : major third, perfect fifth, major seventh

E $\flat$ maj7 : major third, perfect fifth, major seventh

D $\flat$ 9 : major third, perfect fifth, minor seventh, major ninth

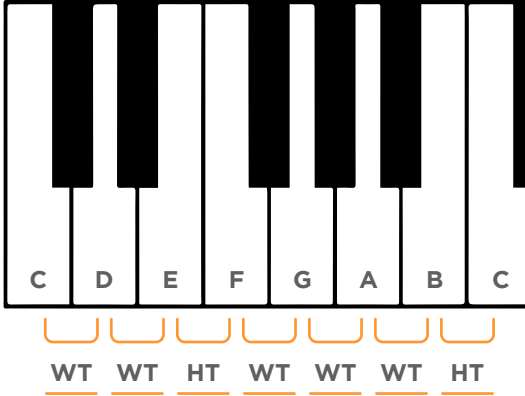
**The overall tonality is more characteristic of a minor key.**

## UNIT 3

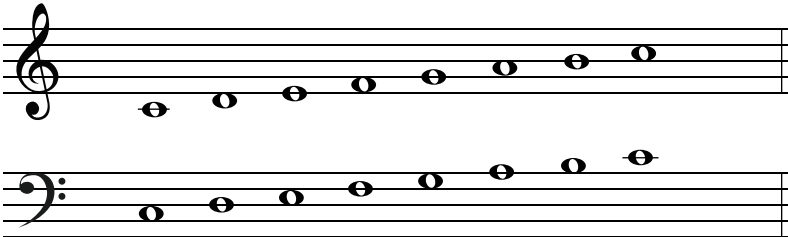


## Basic Exercises

Mark the Whole Tones and Half Tones



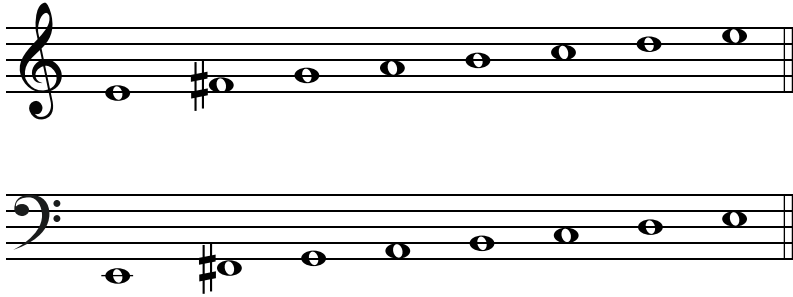
Write a C major scale



Write a G major scale

G A B C D E F# G

Write an E minor scale



## SONG EXERCISES

- 1 A F major has one flat in its key signature, B $\flat$ . The major key of F major contributes to the song's uplifting and upbeat tone. F major reflects the infectious optimism and feel-good lyrics present in "Happy."



2 A

The image shows three intervals in F major on a single staff in treble clef. The first interval is labeled "Maj 3<sup>rd</sup>" and shows F4 and Ab4. The second interval is labeled "Perfect 5<sup>th</sup>" and shows F4 and C5. The third interval is labeled "Octave" and shows F4 and F5.

The major third interval evokes feelings of joy and brightness, while perfect fifths create a sense of stability and completeness. Octaves emphasize the range of emotions present in the melody and add fullness to the song. Together, these three intervals complement the themes and lyrics of "Happy" perfectly.



# Notes

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THE  
**MODERN  
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THEORY**  
HANDBOOK

by Nathan Park

PROJECT EQ

