

LESSON 4

THE EVOLUTION OF THE KEYBOARD

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Before we start playing the black notes, let's take a brief look at how the modern keyboard came to have the form it does. Knowing how it evolved will help in understanding how it works.

You might find it works well to read this lesson now and then reread it after you've done some of the later lessons.

A (very) brief history of the modern keyboard

Here is a picture of the modern keyboard that we're so familiar with, with markings showing the repeating pattern:



Here is the pattern that repeats over and over from one end of the keyboard to the other:



As you can see, there are 7 white notes and 5 black notes, making 12 notes in all.

The keyboard has its roots in music of long ago. We learned in **Book 1** that each note has a specific frequency. The Greek mathematician Pythagoras already had the frequencies of our white notes worked out 2,500 years ago. Smart guy.

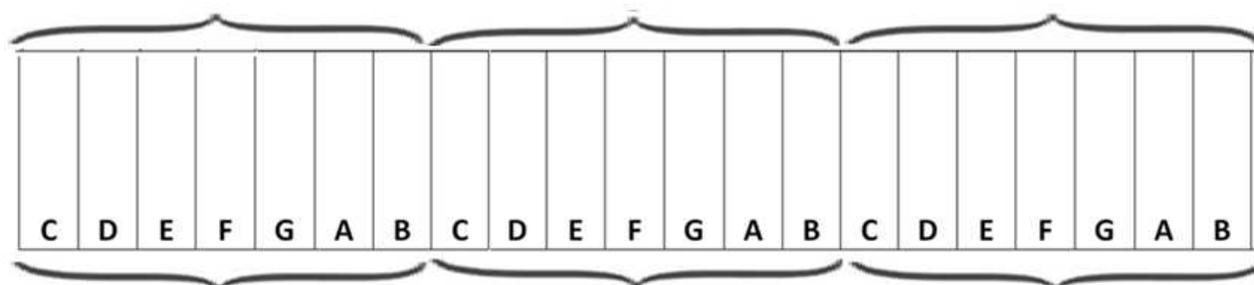
At that time they didn't have keyboards. They had lyres (a type of harp).



The strings of the lyre were tuned (adjusted) to frequencies that made the strings sound pleasing together. Through a combination of musical sense (hearing what sounded good) and mathematical wizardry, the Greeks evolved the sounds of what we now know as the white notes.

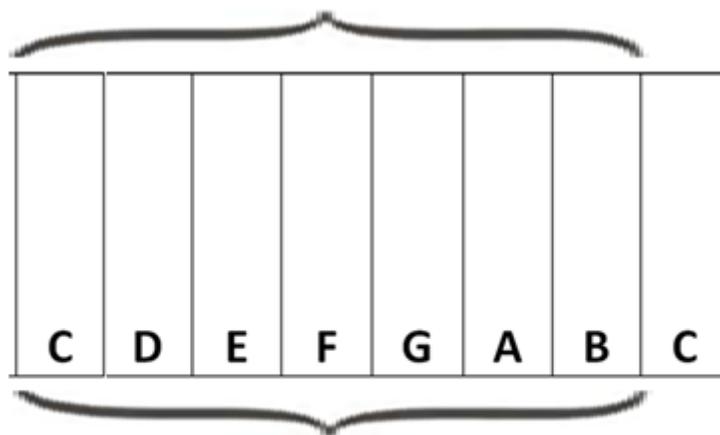
They were not called 'white notes' then because they didn't have a modern keyboard with its arrangement of white and black notes, but essentially they were using the pitches C, D, E, F, G, A and B.

So, no keyboard back then. But we can *imagine* what a keyboard would have looked like if they had one. It would have had only white notes and no black notes. Looking down on this imaginary early keyboard, you'd see this:



Imaginary picture of an early keyboard with only white notes

Here is the repeating pattern:



The repeating pattern
of white notes

I've included an extra C at the right so we can study all that happens in getting from the C at the left to the upper C at the right.

The white notes evolved first because they are based on natural principles of **harmony**.

Definition: Harmony is the subject of how musical notes sound pleasing together.

To illustrate how natural and fundamental the white notes are, consider the tunes you played in **Books 1, 2 and 3** and the **Companion Tune Book** using the white notes alone. You played quite a number of white-note tunes, and there are lots and lots more. Many songs of modern times can be played on the white notes alone: 'Imagine', 'Tom Dooley', 'Blowin' in the Wind', 'Let it Be', 'Never on a Sunday', 'Over the Rainbow', 'This Land is Your Land', 'American Pie', 'Leaving on a Jet Plane', and so on. All of those wonderful songs make no use of the black notes at all. The Greeks could have played them on their lyres!

So you see how complete the white notes can be without involving the black notes at all. Many songs get along just fine using only the white notes.

Maybe it is not surprising, then, that for a long time (in fact a long long time – over 1,000 years!), musicians were content to use only what we now call the 'white notes'.

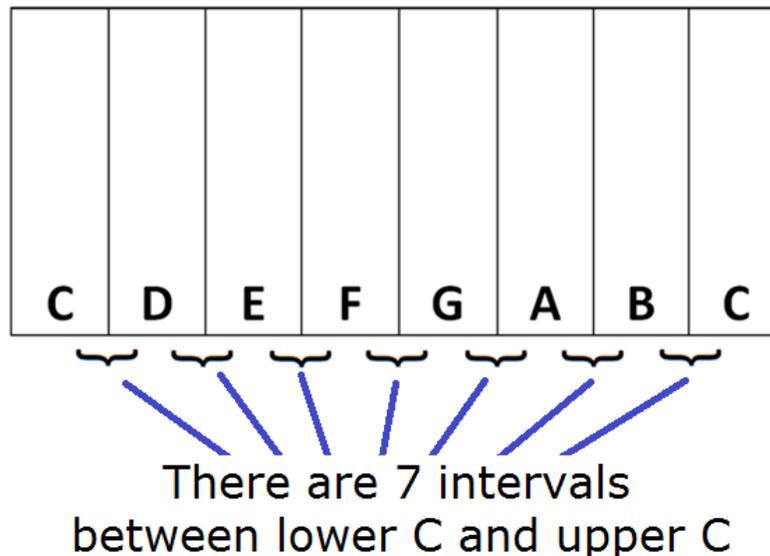
So how come black notes got added? And how come there are 5 black notes (a group of 2 and a group of 3), and not 4 or 6? And how come there is no black note between E and F?

Interesting questions.

And here is my answer.

The sizes of the white-note intervals

Let's take another look at the imaginary early keyboard that had only white notes. If you work your way from lower C to upper C (8 pitches), you'll find there are 7 intervals:

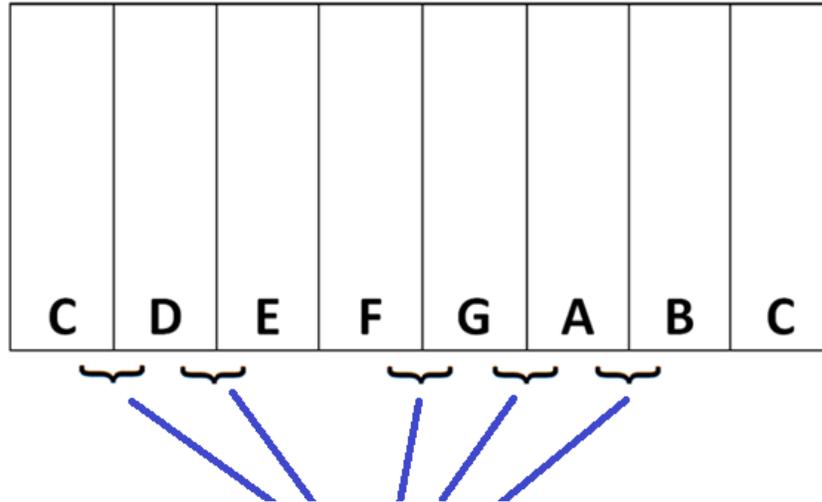


Do that on your keyboard now: play the notes and count the intervals. Like this:

- Play C and say 'start' to indicate that is the starting note.
- Play D and say '1' to indicate that C to D is the first interval.
- Play E and say '2' to indicate you have now played 2 intervals.
- And so on.

You'll find there are 7 white-note intervals.

Musicians noticed that 5 of the 7 intervals are all about the same size:

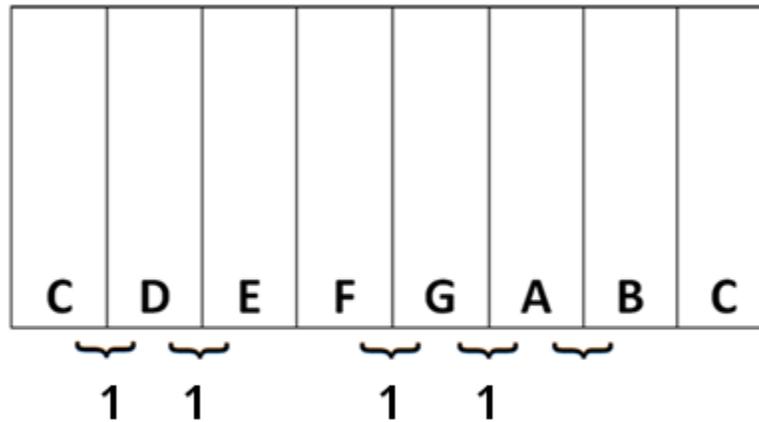


These 5 intervals
are all about the same size

Play each of those intervals now, and see if you can get a sense that the intervals are all about the same size. Like this:

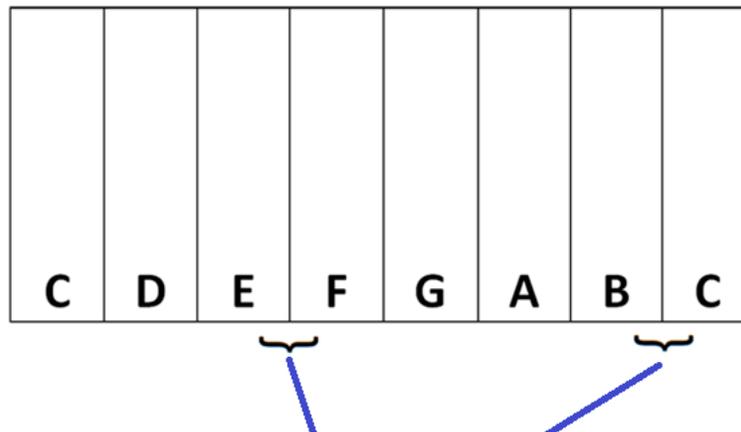
- Play a C and then a D, and listen to the interval (in other words hear how much the pitch D is higher than the pitch C).
- Play a D and then an E, and listen to the interval. Does the D-E interval sound about the same as a C-D interval? In other words, is the difference between D and E about the same as the difference between C and D?
- (Don't play the E-F interval: musicians perceived that as different. We'll get to that in a moment.)
- Play an F and then a G. Is that interval about the same as the interval C-D?
- Play a G and then an A. About the same?
- Play an A and then a B. About the same?
- (Don't play B then C: that one is different too.)

These intervals are all called a **whole tone**, also known as a **tone** or **whole step**.



the 5 whole tones between middle C and upper C
 "1" = whole tone

Musicians also noticed that the other 2 intervals are about half as big as a whole tone:



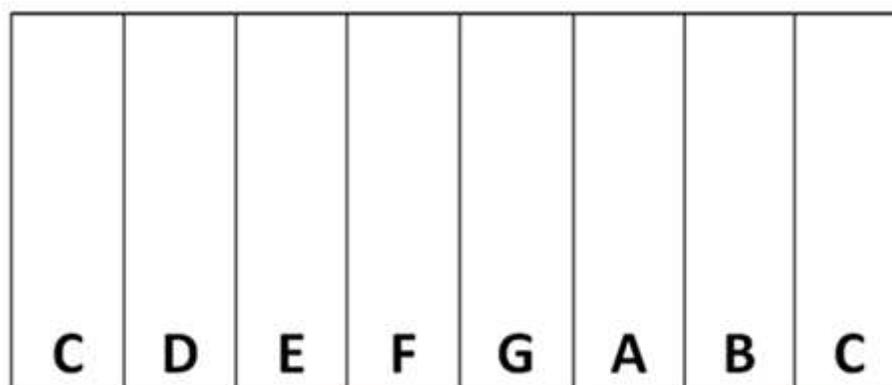
These 2 intervals
 are about half as big as a whole tone

Play them now, and compare them with a whole tone. See if you can hear that those 2 intervals are smaller than a whole tone. Like this:

- Play D then E (whole tone). Now play E then F. Can you hear that E-F is a smaller interval than D-E?
- Play A then B (whole tone). Now play B then C. Can you hear that B-C is a smaller interval than A-B?

If you don't hear the difference, don't worry. This will all become more apparent as you carry on with the next lessons.

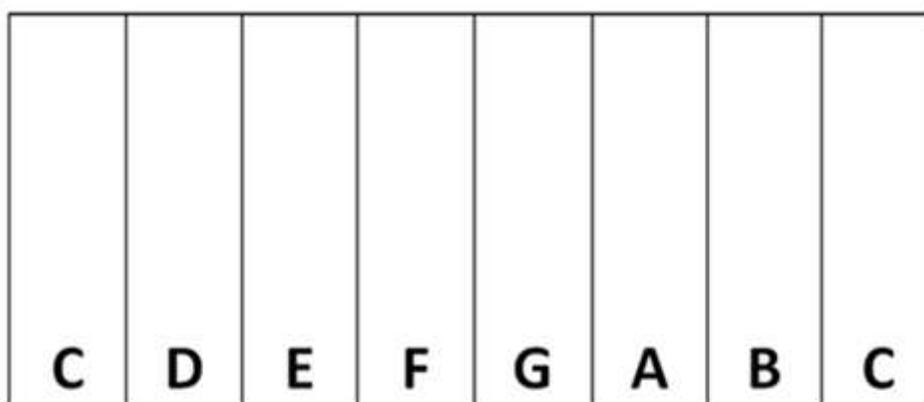
Since those 2 intervals (E-F and B-C) are about half as big as a whole tone, they are called a **half tone**, also known as a **semitone** or **half step**.



$\frac{1}{2}$ $\frac{1}{2}$
 the 2 half tones between middle C and upper C
 " $\frac{1}{2}$ " = half tone

So the sequence of intervals we get by playing from C up to the next higher C consists of:

- 5 whole tones (indicated below by '1')
- 2 half tones (indicated by ' $\frac{1}{2}$ ')



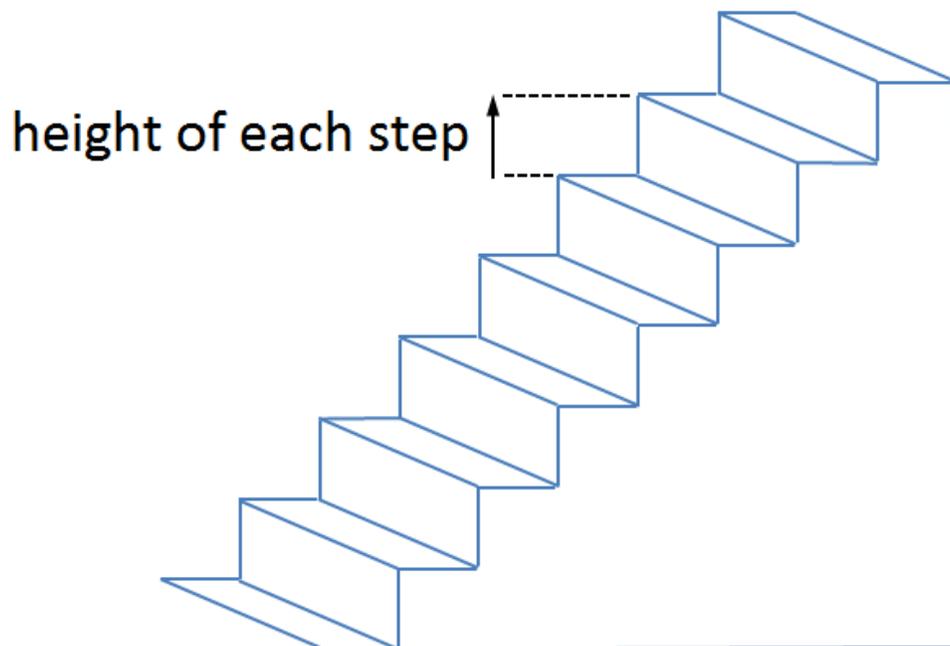
1 1 $\frac{1}{2}$ 1 1 1 $\frac{1}{2}$

the 5 whole tones and 2 half tones
 between middle C and upper C

The white notes are like a staircase

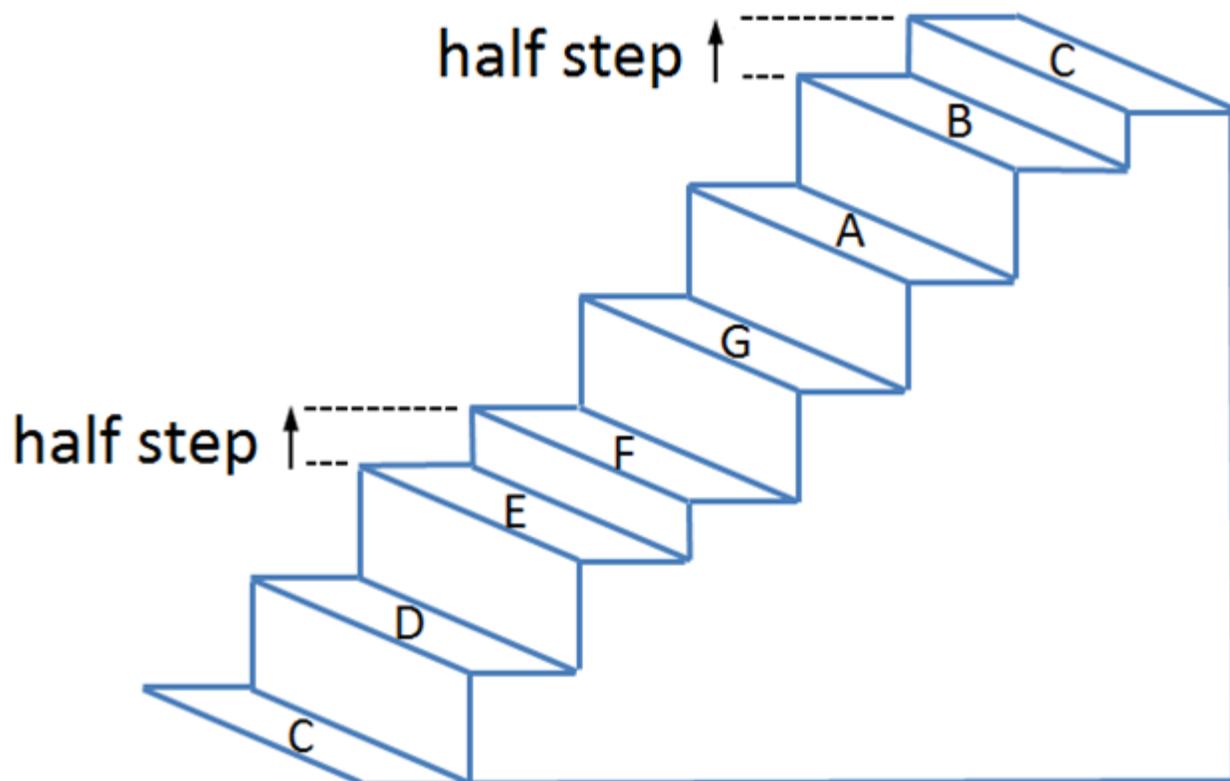
You can think of this like a rather unusual staircase.

A *normal* staircase has all the steps the same height, meaning each step is a standard amount higher than the step before it:



**A normal staircase:
all steps are the same height**

The white notes are like a rather *unusual* staircase with two steps that are half-sized:



The white notes: like a staircase that has 2 half steps

I'm going to have you play each interval from middle C to upper C, using only the white notes. To play an interval, you play a note and then the next white note above it (to the right on your keyboard). As you play each interval, you'll say whether the two notes are a whole tone apart or a half tone apart. Do this now:

1. Play middle C and then the D just to the right of it. Say 'whole tone', since D is a whole tone higher than C.
2. Play D and then E. Say 'whole tone'.
3. Play E and then F. Say 'half tone'.

4. Play F and then G. Say 'whole tone'.
5. Play G and then A. Say 'whole tone'.
6. Play A and then B. Say 'whole tone'.
7. Play B and then upper C. Say 'half tone'.

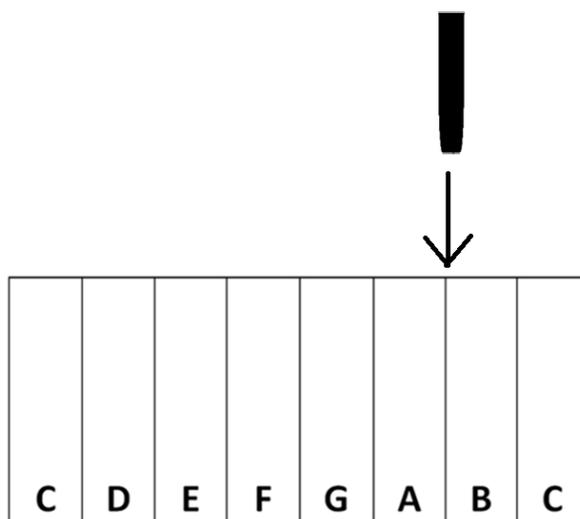
The addition of the black notes

Over time, musicians added half-way notes between the white notes that are a whole tone apart. In other words, they added a half-way note between C and D since they are a whole tone apart, but they did not add a half-way note between E and F because they are only a half tone apart.

Why did they do that? **Because they wanted to express things, musically, that the white notes alone could not do.** They started to get a taste of modern music, which has a richness that did not exist in earlier times. More about that in a moment.

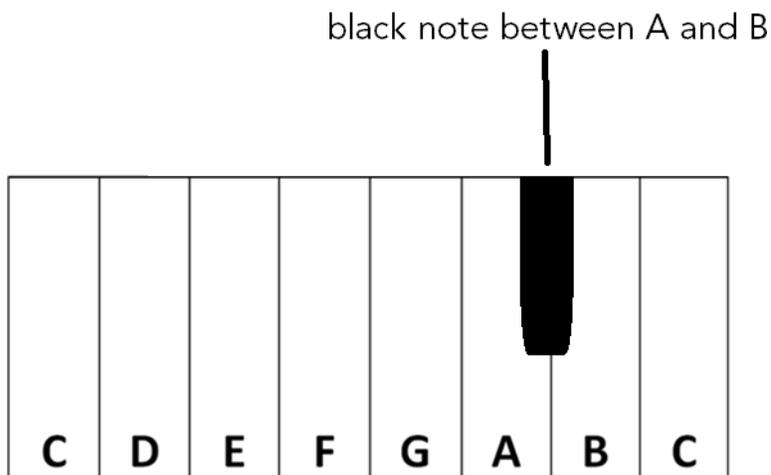
On the modern keyboard, the half-way notes are black.

The half-way notes didn't all arrive at the same moment in history. The black note between A and B arrived first:



The first black note was inserted between A and B.

At that point the keyboard would have looked something like this:



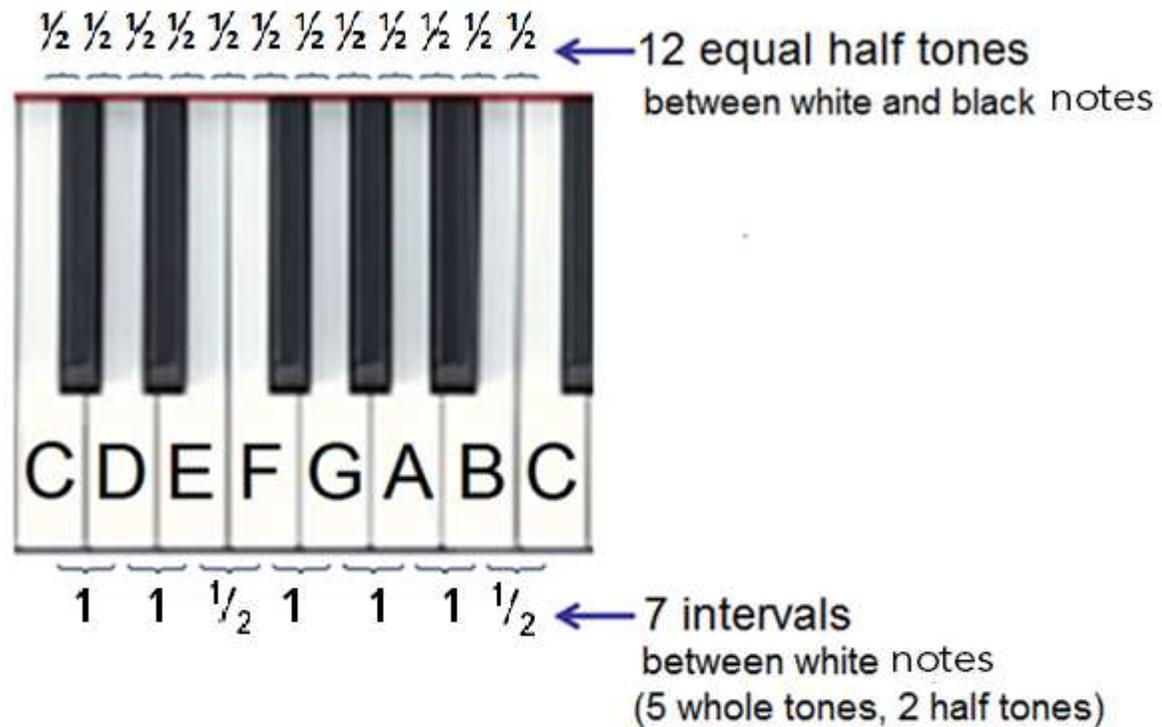
Imaginary keyboard with the first black note added.

Then the other black notes were added until eventually all 5 whole tones were separated by a half-way note. Since the white notes have 5 whole tones, we ended up with 5 black half-way notes.



All 5 black notes added to the imaginary keyboard.

And when we take the white notes and black notes together, we end up with a complete sequence of 12 equal half tones:



result of inserting a black half-way note
between each pair of white notes
that are a whole tone apart

Look at the equal half tones shown at the top of the above picture.

- The 1st half tone is from white note C to the black note just to the right of it. As you learned in Lesson 1, that black note is called 'C sharp'.
- The 2nd half tone is from that black note (C sharp) to the white note D.
- The 3rd half-tone is from white note D to the black note just to the right of it (D sharp).
- And so on.

How many half tones are there from the low C (at the left) to the high C (at the right)? Count them, like this:

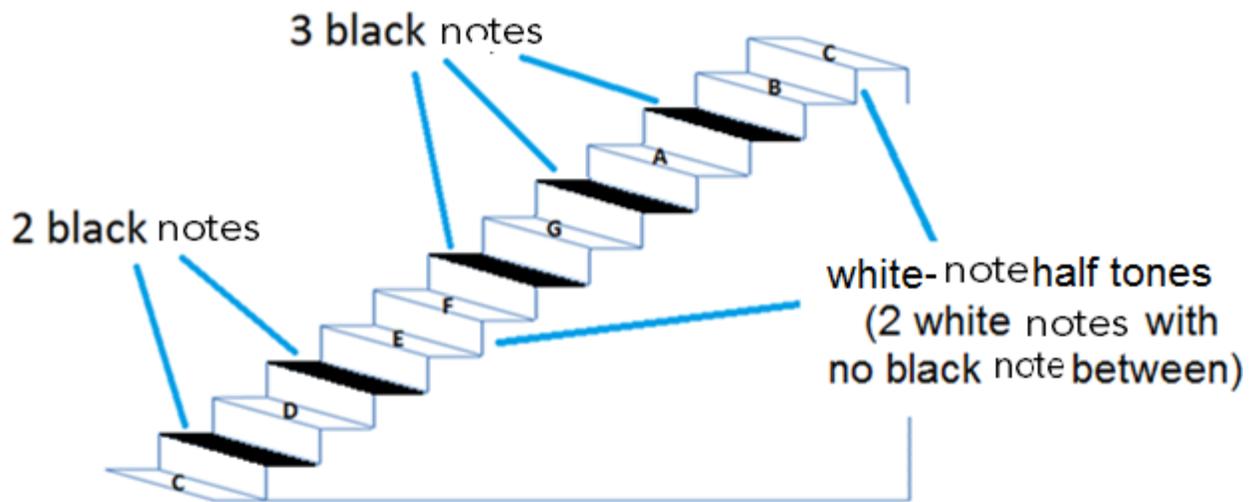
- Play C and say 'start' to indicate that is the starting note.
- Play the black note to the right of C and say '1' to indicate you have played 1 interval.

- Play D and say '2' to indicate you have now played 2 intervals.
- Play the black note to the right of D and say '3' to indicate you have played 3 intervals.
- And so on.

You'll find there are 12 half-tone intervals.

The interval from each note (white or black) to the note next to it (white or black) is a half tone.

Here's what our staircase looks like now:



**the modern system of 12 equal half tones:
like a staircase made of 12 small equal steps**

I'm going to have you play each interval from middle C to upper C. This time we're going to include all of the black notes as well as the white notes. To play an interval, you play a note and then the next note above it (to the right on your keyboard), regardless of whether it is white or black. As you play each interval, you'll say 'half tone', because all of these intervals are half- tones.

1. Play middle C and then play the black note to the right of middle C. Say 'half tone', because the black note is a half tone higher than middle C.
2. Play the same black note again, and then play the white note D. Say 'half-tone'.

3. Play D and then the black note to the right of D. Say 'half -tone'.
4. And so on, all the way up to upper C.

Why the black notes were added

As I said earlier, the black notes were added because musicians wanted to express things, musically, that the white notes could not do.

When the black notes were added, a whole universe of music opened up.

The black notes, and the system of 12 equal half tones, have made possible the vast body of music of the past 500 years.

This includes all the music from Palestrina (a composer of 500 years ago) to Mozart to Gershwin, from jazz to swing to rock and roll, from pop to country to reggae, from Israeli dance music to Scottish bagpipe tunes to Hungarian folk songs, from glee to Broadway to gospel. All of that wealth of music is made possible by the modern system of 12 half tones.

- Scottish bagpiper (use the one you already did) - MAN
- Concert pianist (grand piano, tuxedo with long tails) – MAN, with tux/tails, face concentrating
- Black gospel singer in a church robe - WOMAN
- Saxophone jazz player – MAN - silhouette
- Pop recording artist singing into a studio microphone – WHITE WOMAN



Black notes can cover eight octaves



Concert pianist uses black notes



Gospel singer using black notes



Jazz musician uses black notes



Pop recording artist uses black notes

That will become apparent as we progress through this course.

What music would exist without the black notes?

- Without the black notes, you can have the Beatles' song 'Imagine' because it can be played using only white notes. But you can't have 'Yesterday' because it uses both white and black notes and cannot be played on the white notes alone.
- You can have Elvis's 'Love Me Tender', but you can't have 'Heartbreak Hotel' because it needs black notes.
- You can have Bob Dylan's 'Blowin' in the Wind', but you can't have 'I'll Be Your Baby Tonight'.
- You can have George Gershwin's 'Summertime', but you can't have 'Someone to Watch Over Me'.
- You can have Cole Porter's song 'Miss Otis Regrets', but you can't have 'Night and Day'.
- And you probably can't have *any* of the music of Mozart, Wagner, Scott Joplin or Louis Armstrong.

Did you know that 'Yesterday' was voted the best song of the 20th century in a poll conducted by the BBC? Without the black notes, no 'Yesterday'.

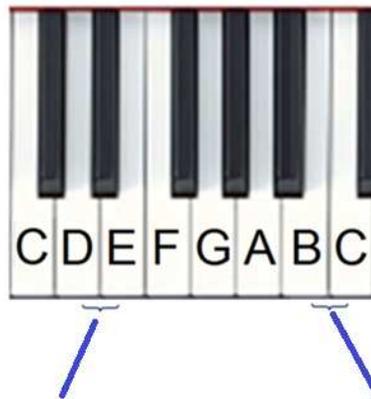
I'm glad we added the black notes 500 years ago. I think it was a good move, don't you?

So there it is, the story (or at least my version of the story) of how the modern piano keyboard ended up looking the way it does.

Recognizing whole tones and half- tones

Now that we've added the black notes to create a system of equal half tones, we can easily recognise which intervals between white notes are whole tones and which are half-tones:

- Two white notes are a whole tone apart if they have a black note between them.
- Two white notes are a half tone apart if they have no black note between them.



D and E are a whole tone apart because they have a black note between them

B and C are a half tone apart because they have **no** black note between them

Practical

Build Your Skill

Exercise 1:

This is good for getting in touch with the whole of your keyboard.

1. Play every note on your keyboard, white and black, starting all the way at the left and going all the way to the right.

Exercise 2:

Play rising half tone intervals

By 'rising interval' we mean that the second note is higher than the first note.

1. Play F.
 - a. Play the note a half tone higher than F. That is the note immediately to the right, which is a black note.
 - b. Observe that by playing those two notes one after the other, you played a rising half tone interval.
2. Play B.
 - a. Play the note a half tone higher than B. That is the note immediately to the right, which is the white note C since there is no black note to the right of B.
 - b. Observe that by playing those two notes one after the other, you played a rising half tone interval.
3. Play the black note between G and A.
 - a. Play the note a half tone higher than that black note. That is the note immediately to the right, which is the white note A.
 - b. Observe that by playing those two notes one after the other, you played a rising half tone interval.
4. Pick any note and play it.
 - a. Play the note a half tone higher.
5. Continue doing this until you can easily and accurately play a note and then play the note a half tone higher.

6. If you like, you can make a game of it with a friend. Have him play a note at random, and then you play the note a half tone higher. Keep doing that until you can do it easily.

Exercise 3:

Play falling half tone intervals

By 'falling' we mean that the second note is lower than the first note.

1. Play F.
 - a. Play the note a half tone lower than F. That is the note immediately to the left, which is the white note E since there is no black note to the left of F.
 - b. Observe that by playing those two notes one after the other, you played a falling half tone interval.
2. Play B.
 - a. Play the note a half tone lower than B. That is the note immediately to the left, which is a black note.
 - b. Observe that by playing those two notes one after the other, you played a falling half tone interval.
3. Play the black note between G and A.
 - a. Play the note a half tone lower than that black note. That is the note immediately to the left, which is the white note G.
 - b. Observe that by playing those two notes one after the other, you played a falling half tone interval.
4. Pick any note and play it.
 - a. Play the note a half tone lower.
5. Continue doing this until you can easily and accurately play a note and then play the note a half tone lower.

6. If you like, make a game of it with a friend.

Exercise 4:

Play rising whole tone intervals

1. Play F.

- a. Play the note a whole tone higher than F. A whole tone is made up of two half tones, so we need to find the note that is two notes to the right of F. The first note to the right is a black note, and the next after that is the white note G, so that's the one we want. Play G.
- b. Observe that by playing those two notes one after the other, you played a rising whole tone interval.

2. Play B.

- a. Play the note a whole tone higher than B. The first note to the right is the white note C, and the next after that is a black note, so play that black note.
- b. Observe that by playing those two notes one after the other, you played a rising whole tone interval.

3. Play the black note between G and A.

- a. Play the note a whole tone higher than that black note. The first note to the right is the white note A, and the next after that is a black note, so play that black note.
- b. Observe that by playing those two notes one after the other, you played a rising whole tone interval.

4. Pick any note and play it.

- a. Play the note a whole tone higher.

5. Continue doing this until you can easily and accurately play a note and then play the note a whole tone higher, without thinking.
6. If you like, make a game of it with a friend.

Exercise 5:

Playing falling whole tone intervals

1. Play F.
 - a. Play the note a whole tone lower than F. A whole tone is made up of two half tones, so we need to find the note that is two notes to the left of F. The first note to the left is the white note E, and the next after that is a black note, so play that black note.
 - b. Observe that by playing those two notes one after the other, you played a falling whole tone interval.
2. Play B.
 - a. Play the note a whole tone lower than B. The first note to the left is a black note, and the next after that is the white note A, so that's the one we want. Play A.
 - b. Observe that by playing those two notes one after the other, you played a falling whole tone interval.
3. Play the black note between G and A.
 - a. Play the note a whole tone lower than that black note. The first note to the left is the white note G, and the next after that is a black note, so play that black note.
 - b. Observe that by playing those two notes one after the other, you played a falling whole tone interval.
4. Pick any note and play it.

- a. Play the note a whole tone lower.
5. Continue doing this until you can easily and accurately play a note and then play the note a whole tone lower, without thinking.
6. If you like, make a game of it with a friend.