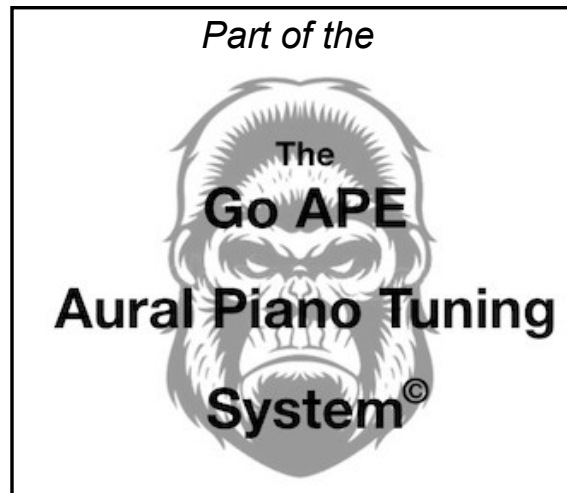


**Bisecting Beat Speed Windows Temperament Sequence**  
*with*  
**Aurally Measured Inharmonicity**  
*for*  
**Superior Accuracy and Precision**

Colour eBook Edition



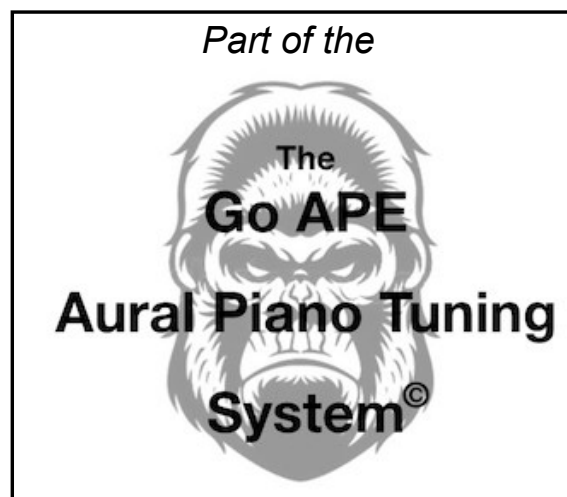
*by*

*Mark Cerisano, R.P.T., B.Sc.(Mech.Eng.), Dip.Ed.(Music)*



**Bisecting Beat Speed Windows Temperament Sequence**  
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*LaCerilondano Publishing*  
2020

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This book is printed in black and white.

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## INTRODUCTION

The Go APE Aural Piano Tuning System is a new way of aurally tuning pianos that is more **A**ccurate, **P**recise, and **E**fficient than any aural method that has ever been developed before!

The Go APE System consists of three elements:

- 1) The Bisecting Beat Speed Windows temperament sequence and stretch sequence.
- 2) The Double String Unison technique of tuning two strings at once instead of tuning a single string before adding the other unison strings.
- 3) Non-Speaking Length Tension Analysis for knowing how to make small changes in a string's pitch and have it be stable.

Each of these elements are interesting in their own right, *but they won't improve your tuning much until you learn to use all three together.*

This booklet is an excellent source to use to help you memorize the temperament procedure. It has been designed to be used at the piano to make learning the sequence even easier.

If you have any questions, please email [mark@howtotunepianos.com](mailto:mark@howtotunepianos.com)

Mark Cerisano, RPT

This book was originally designed to be a flip book.

As you worked through it, it successive page was printed on the next physical page, not on the back of the first page.

The technician placed the book on top of the piano and flipped pages, always keeping the book in the same orientation. This eliminated the need to continually flip the book around to see the next page if it would have been on the back of the page you were just looking at.

And then when you reached the end, you would flip the book around and continue back, looking only at the backs of the pages you just skipped, only flipping pages, not the book.

This eBook has been formatted to be sequential. I.e. you just go through the pages from beginning to end.

If you print and bind the pages into a book or binder, and place the book on the piano to work through the sequences, you'll need to flip the book around every time you flip a page.

If you are interested in using the “no book flip” feature, consider purchasing the hard copy book from [store.howtotunepianos.com](http://store.howtotunepianos.com).

## **How to use this eBook**

*If you decide to print out these pages, it is strongly recommended that you print out the pages in colour. The image elements have not been confirmed to work in black and white. Some of the image elements give information based on their colour.*

### Option 1

1. You can just flip through the pages on your phone or computer.



### Option 2

1. Print out this eBook on single pages
2. You can place the pages on top of a piano and just move through the sequence, placing the top page under the pile.
3. If you decide to bind the pages, consider using a coil binding service or machine. This will allow you to flip the pages without flipping the book, and also keep the pages from getting lost.
4. Bind odd page numbers at the top. Even page numbers would then be bound at the bottom.

### Option 3

1. Print out this eBook using a printer capable of printing on two sides. Choose the Two Sided Printing option.
2. Ideally you will want to have the pages coil bound. Bind odd page numbers at the top. Even page numbers would then be bound at the bottom.
3. Then you can move through the pages. You will still have to flip the book at each page.

These sheets are meant to be used at the piano. Simply place page 5 on top of the piano you are tuning.

Following each step as it is written out. The note you are to tune is marked with a . Notes that have already been tuned will be marked as .



These first steps are common to all pianos...



# A4

## The Common Start

Tune A4 using an ETD and overpull or underpull by 25%,

Take into consideration the pitch of all the other A's.

(If only A4 is flat for example, don't over pull it.)

The maximum overpull is 15 cents. Don't overpull if strings look weak.






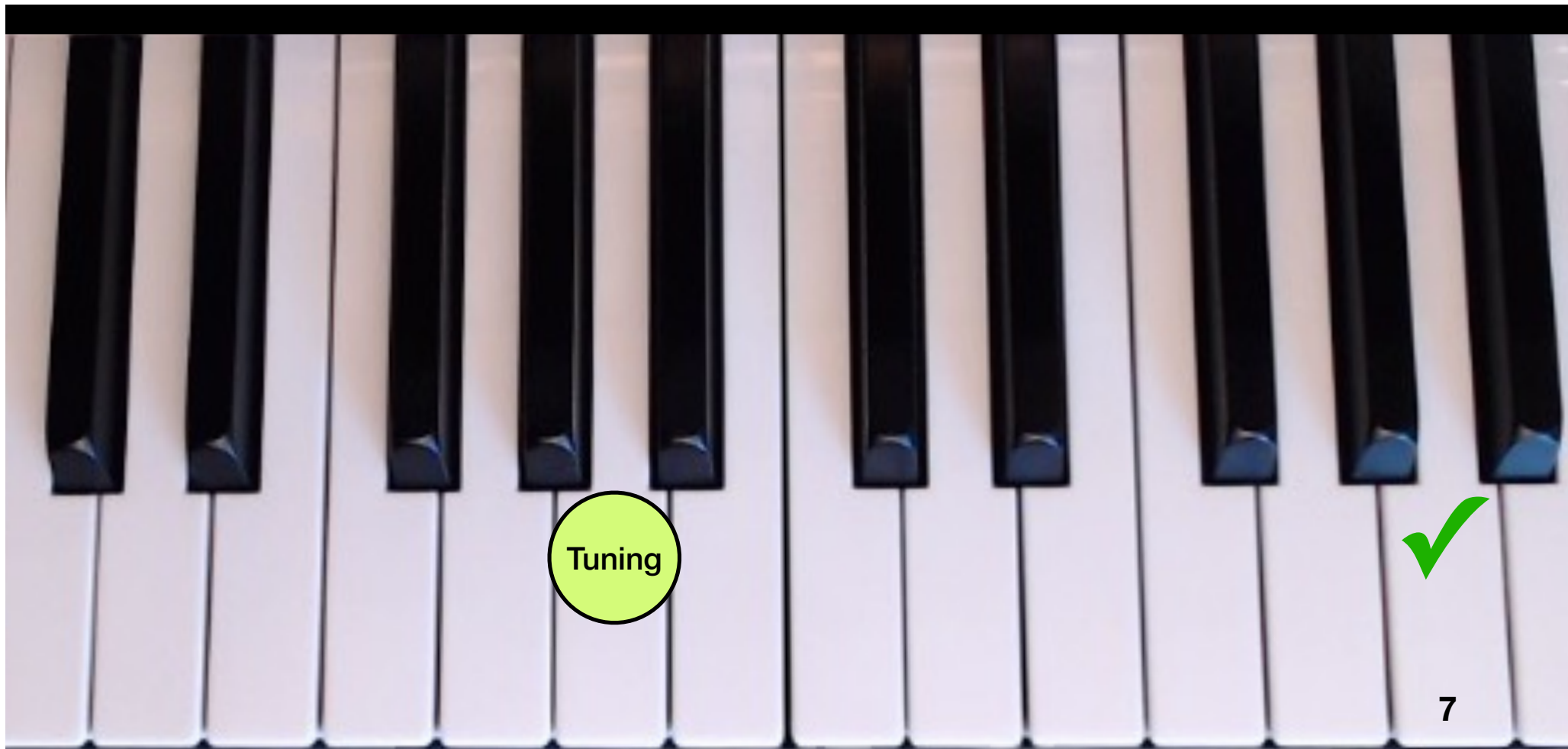
# A3

## The Common Start

Tuning A3 from A4 by aurally measuring inharmonicity.

This is how you do it...




	Note Being Tuned
	Already Tuned
	Check Note

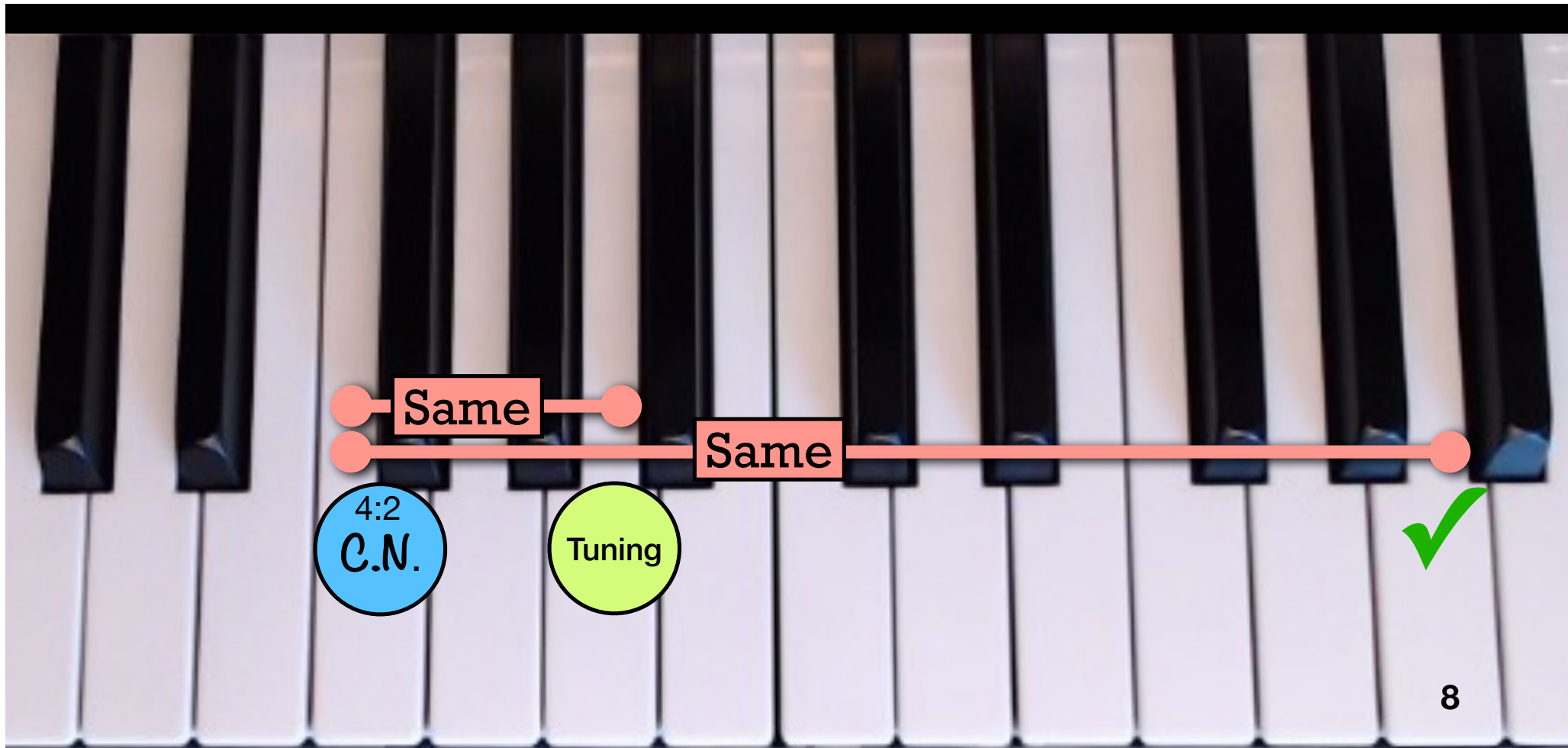


# A3

Tune A3 from A4.

Tune a pure 4:2 (F3A3=F3A4)




	Note Being Tuned
	Already Tuned
	Check Note

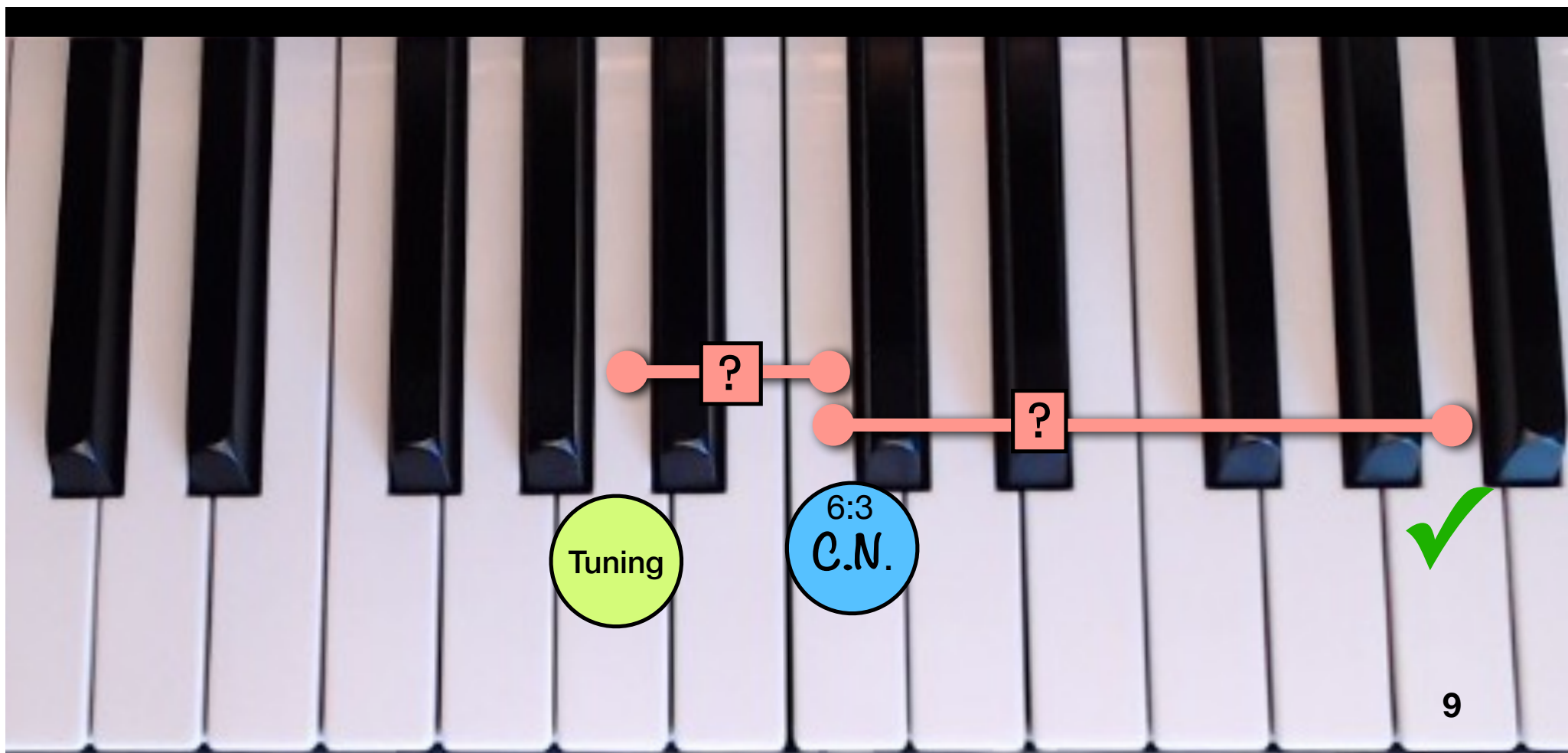


# A3

Tune A3 from A4.

Check the 6:3 (A3C4 and C4A4)




	Note Being Tuned
	Already Tuned
	Check Note

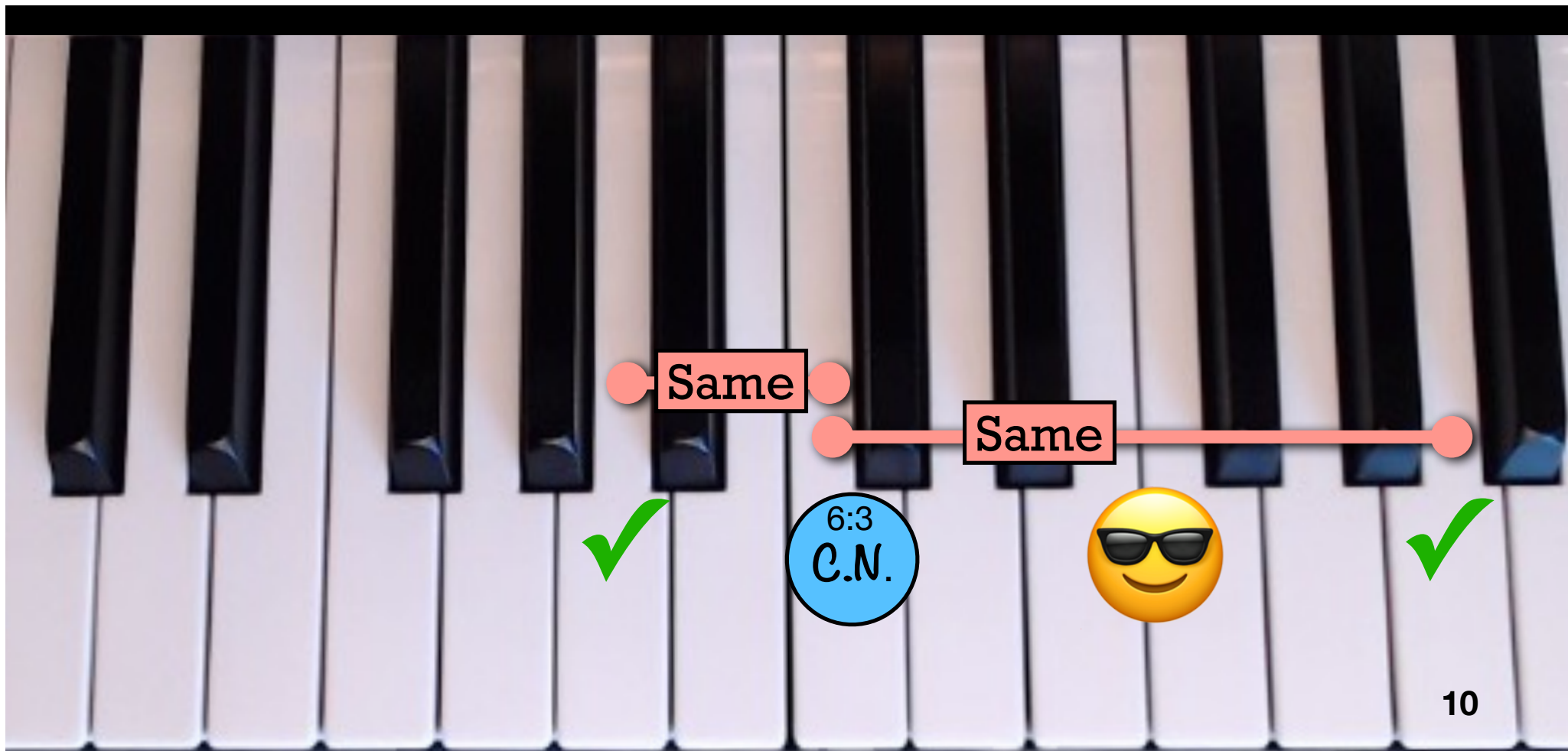


# A3

Tune A3 from A4.

If the 6:3 is pure, i.e.  $A3C4 = C4A4$ ,  
then this is a **Small Scale Octave**.

-  Note Being Tuned
-  Already Tuned
-  Check Note






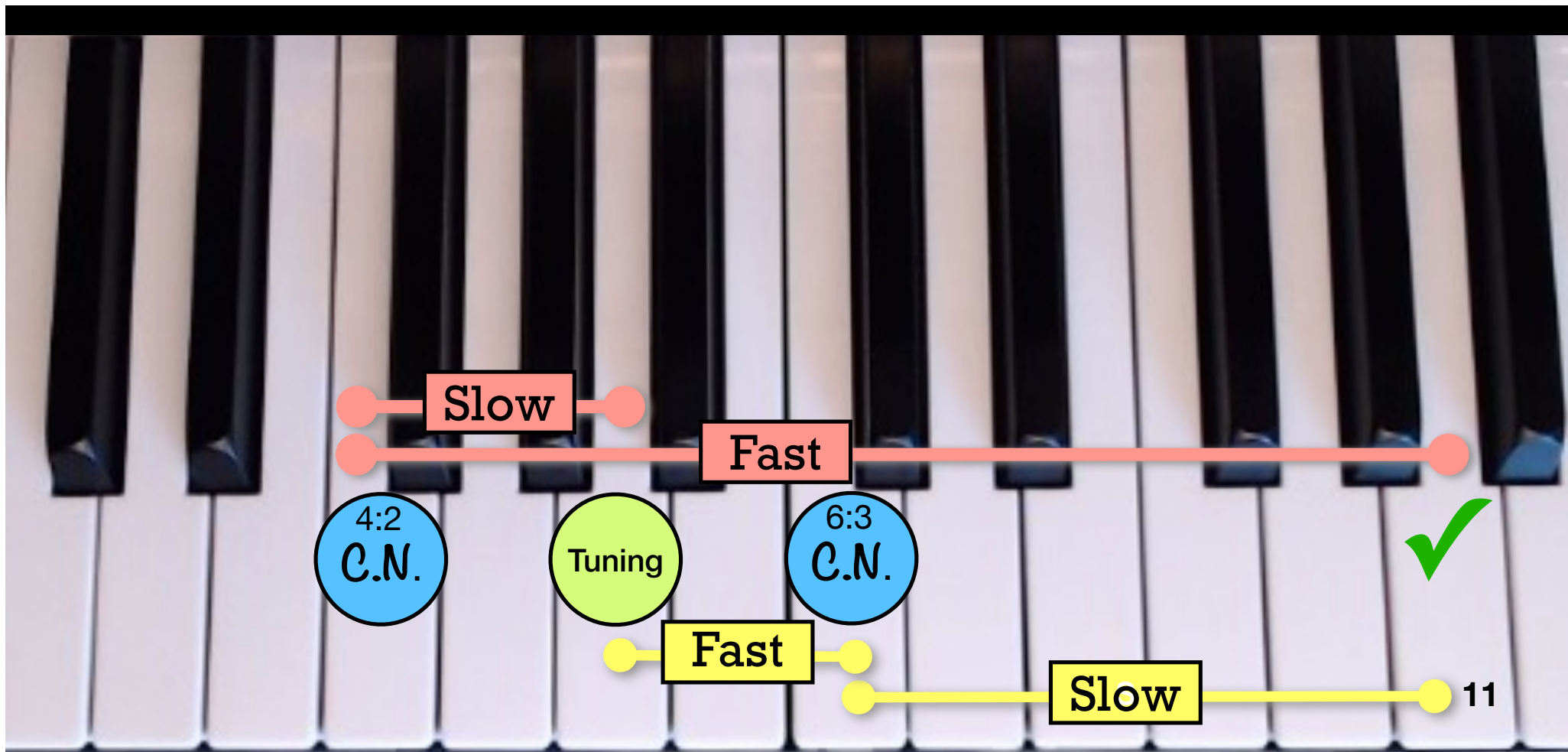
# A3

Tune A3 from A4.

If the 6:3 is *not* pure, tune a wide 4:2, narrow 6:3

(F3A3 < F3A4 and A3C4 > C4A4)




	Note Being Tuned
	Already Tuned
	Check Note

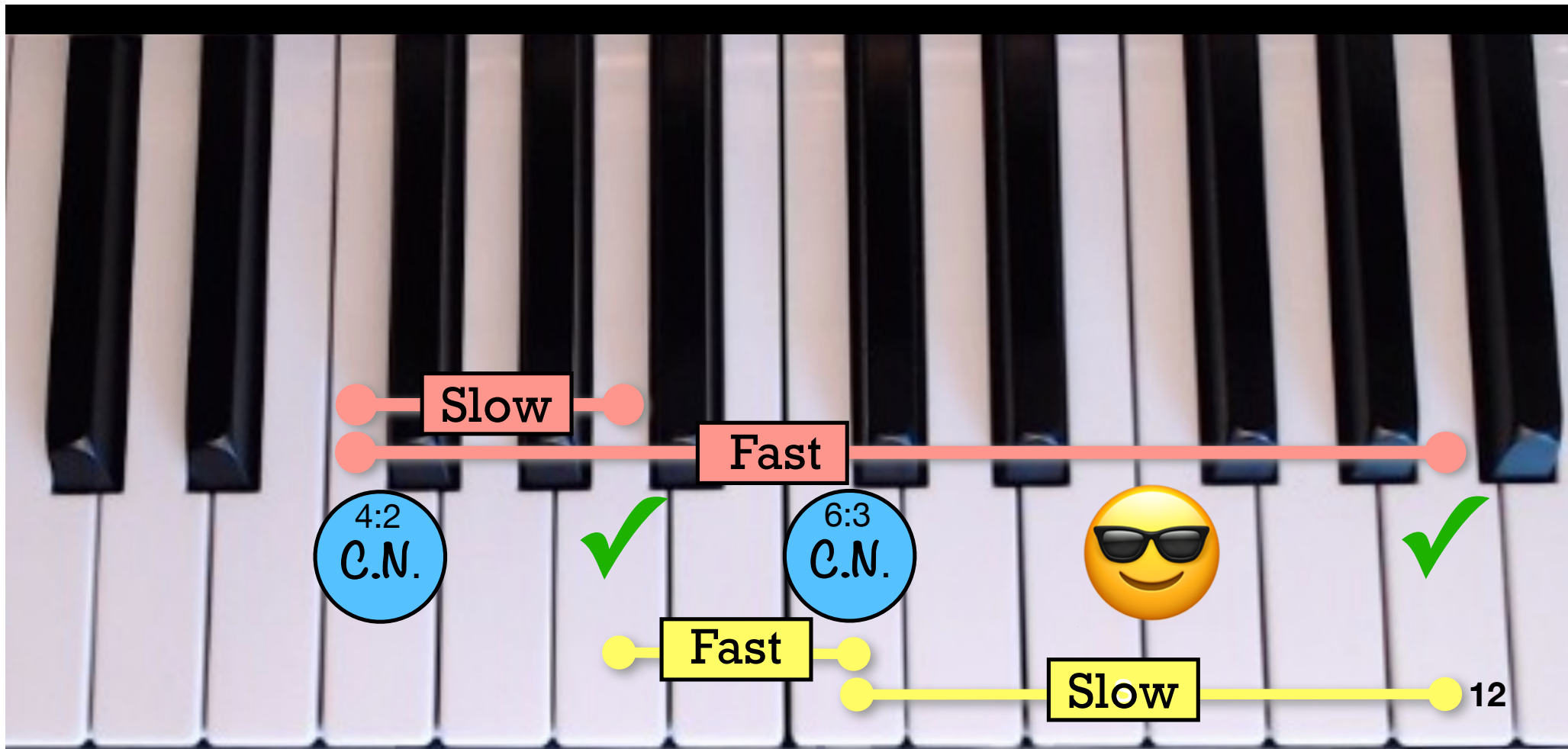


# A3

Tune A3 from A4.

If A3A4 sounds good, this is a **Medium** Scale Octave.




	Note Being Tuned
	Already Tuned
	Check Note

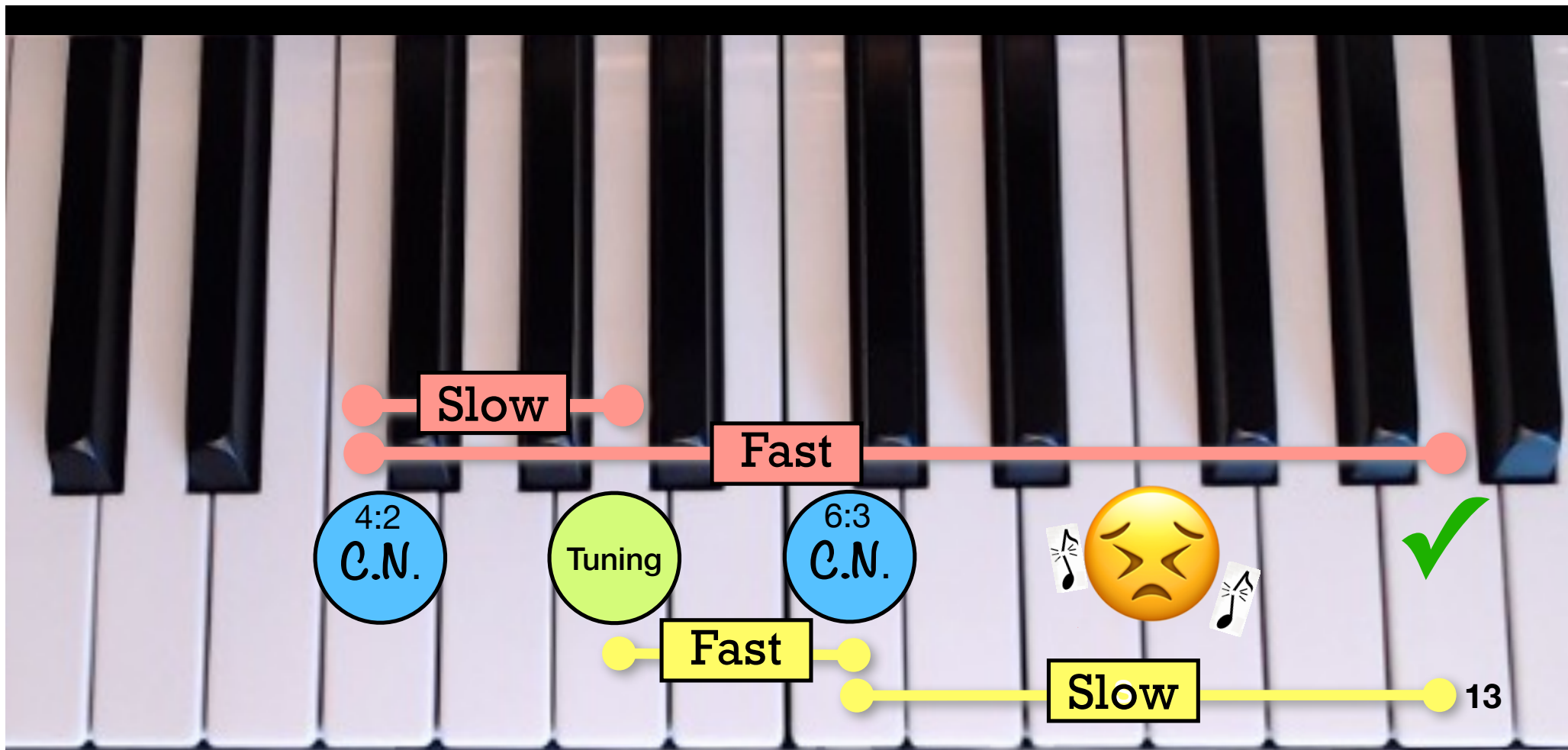


# A3

## Tune A3 from A4.

If your wide 4:2/narrow 6:3 sounds bad,  
then this isn't a Medium Scale octave and may  
need to be tuned as a pure 4:2/very narrow 6:3.

-  Note Being Tuned
-  Already Tuned
-  Check Note






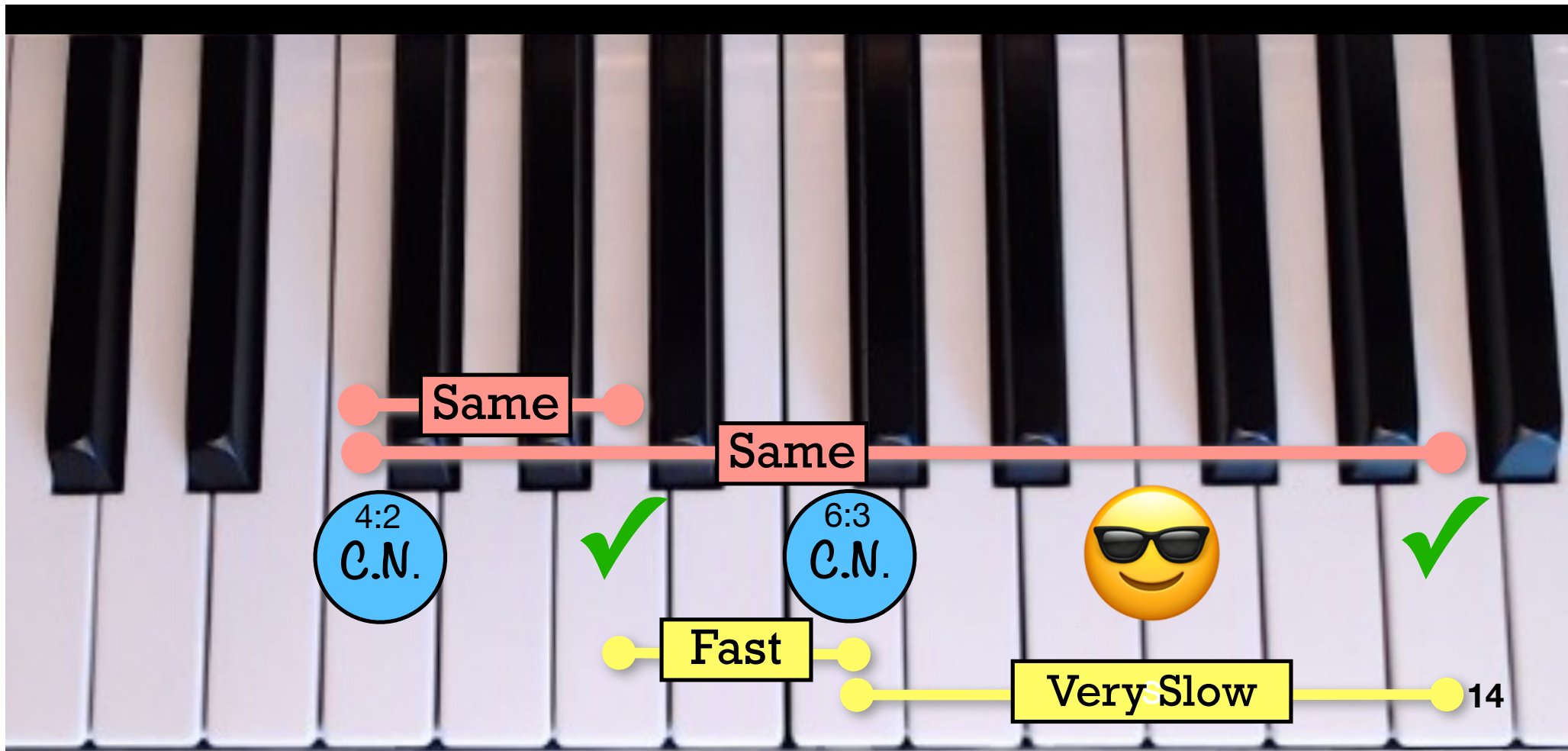
# A3

## Tune A3 from A4.

If the pure 4:2/very narrow 6:3 sounds good,  
then this is a **Large Scale Octave**.




If this doesn't sound good, tune a  
pure 2:1 or tune without check notes

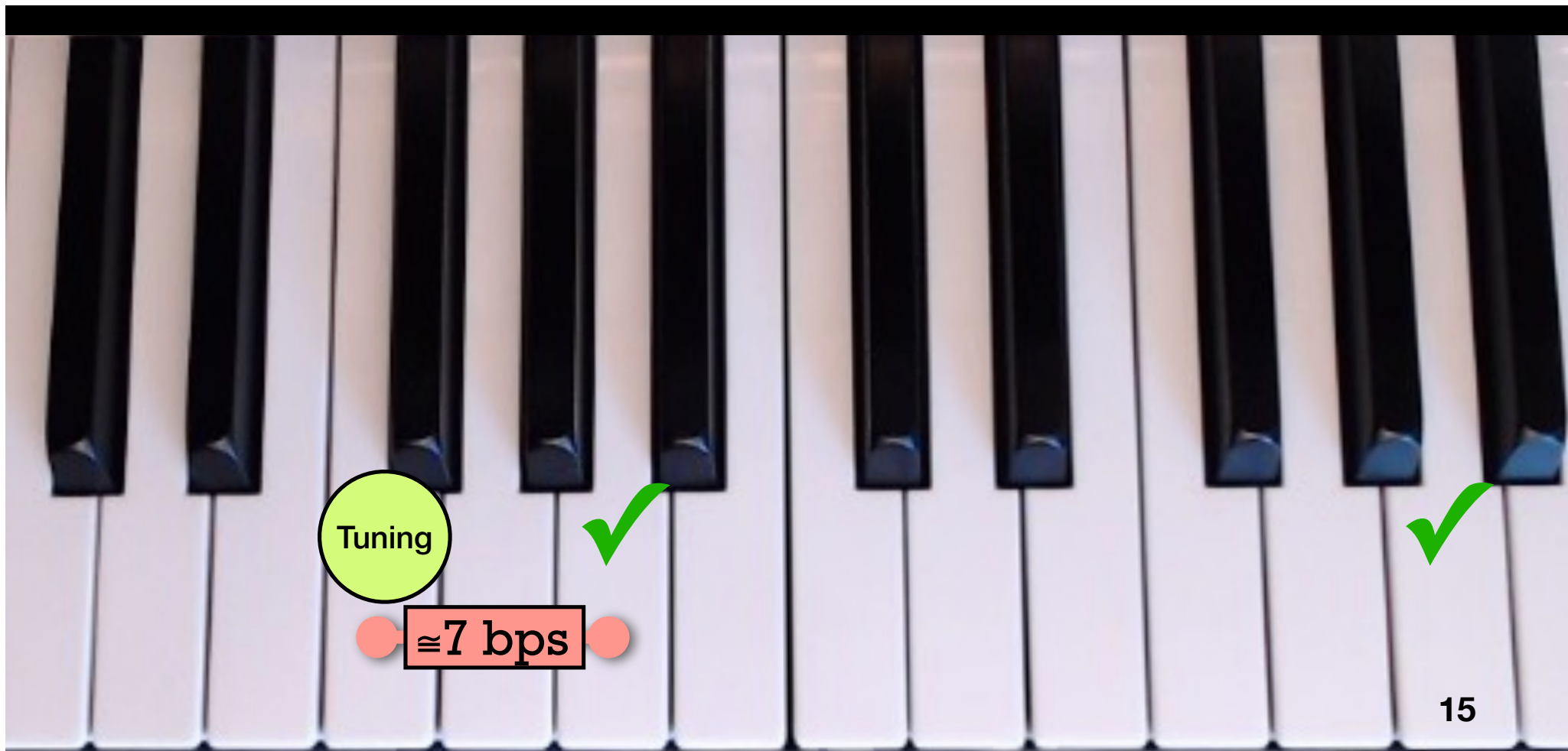
-  Note Being Tuned
-  Already Tuned
-  Check Note



# F3

Set F3A3 to approximately ( $\cong$ ) 7 beats per second  
(as fast as you can tap)

	Note Being Tuned
	Already Tuned
	Check Note



# F4

F3 is now temporarily set.

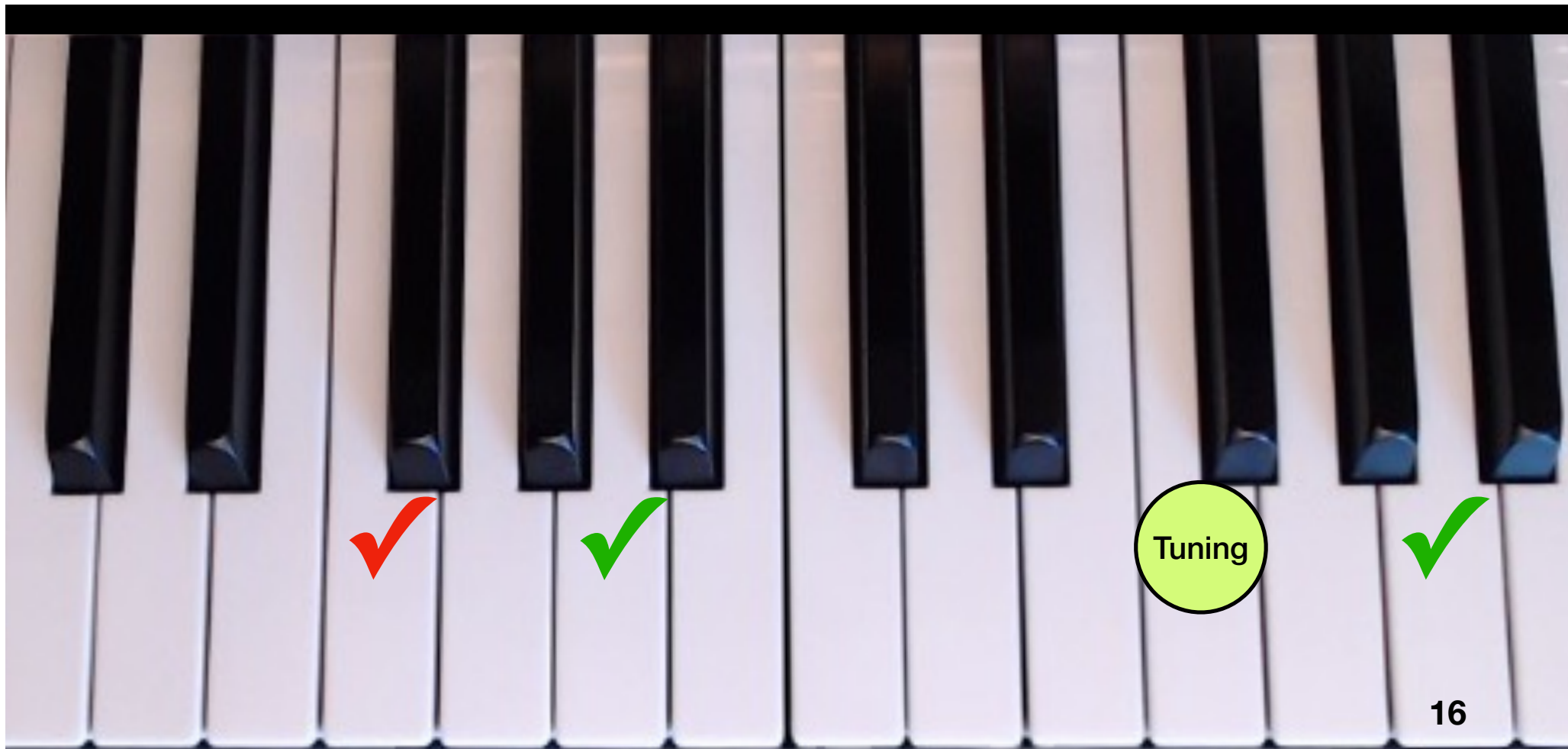
Now we tune F3F4 as the best size depending on the inharmonicity.

✓ Temporarily Tuned

 Note Being Tuned

 Already Tuned




 Check Note



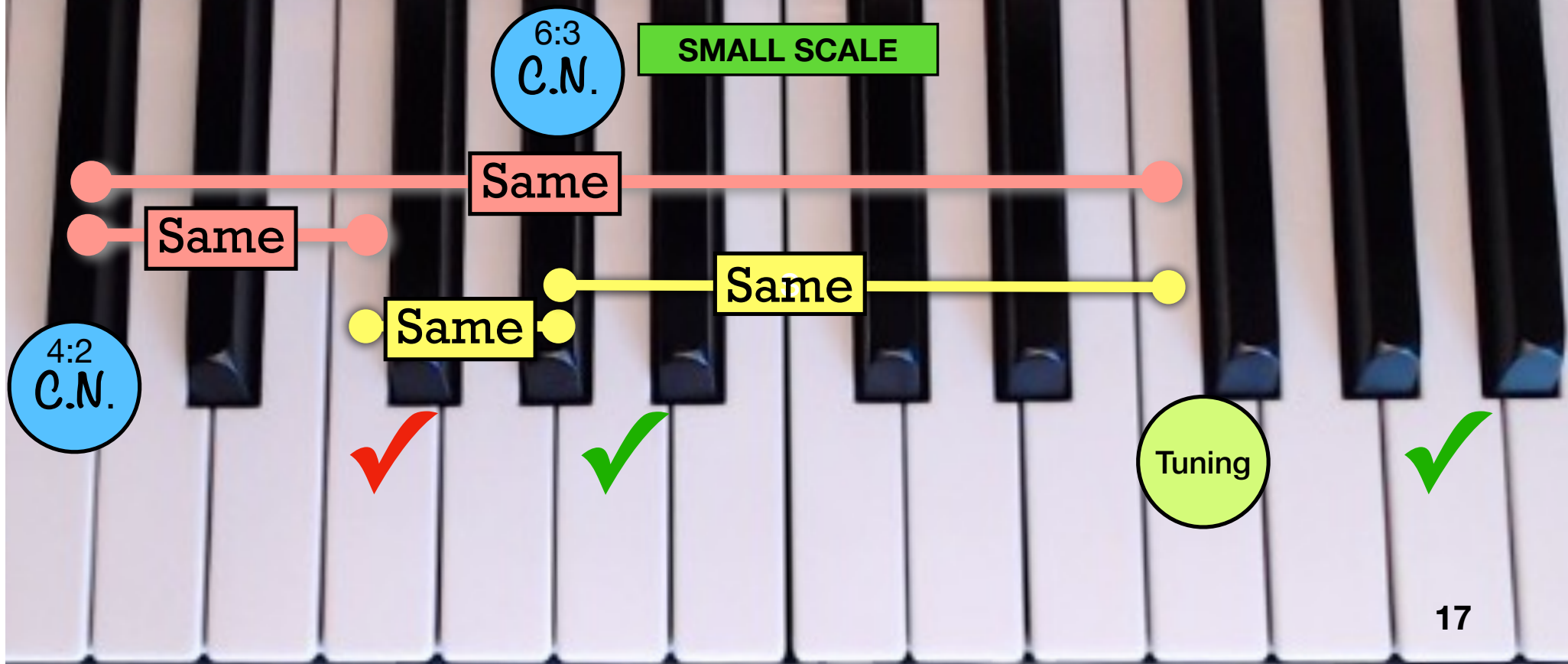
# F4

Set the best F3F4 as a:  
pure 4:2/pure 6:3 (**Small Scale**)  
C#3F3 = C#3F4 and F3G#4 = G#4F4

✓ Temporarily Tuned

-  Note Being Tuned
-  Already Tuned
-  Check Note

Only one of these sizes sounds best: Small, Medium, or Large



**F4**

OR

a wide 4:2/narrow 6:3 (**Medium Scale**)

$C\#3F3 < C\#3F4$  and  $F3G\#4 > G\#4F4$

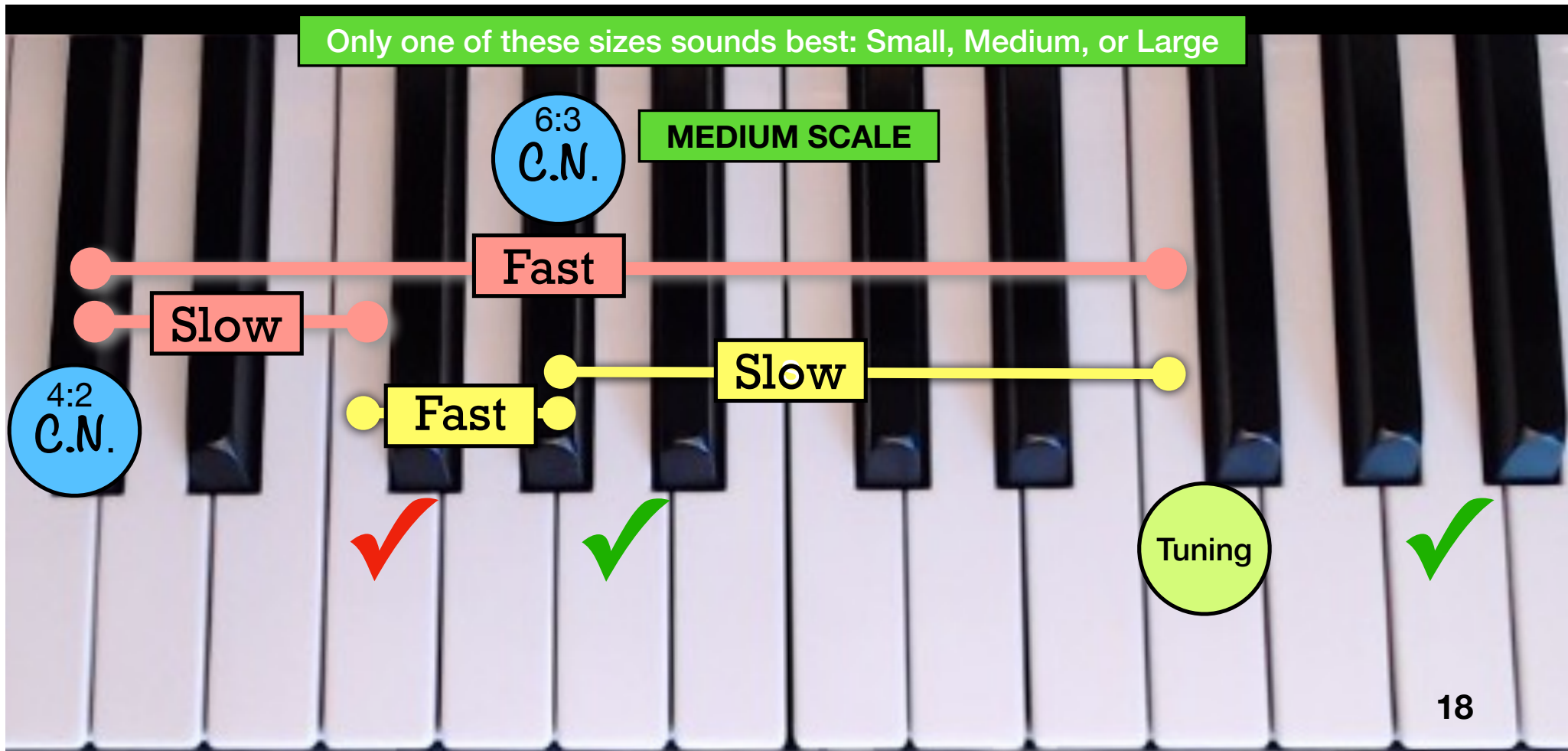
✓ Temporarily Tuned

 Note Being Tuned

 Already Tuned

 Check Note

Only one of these sizes sounds best: Small, Medium, or Large






# F4

OR

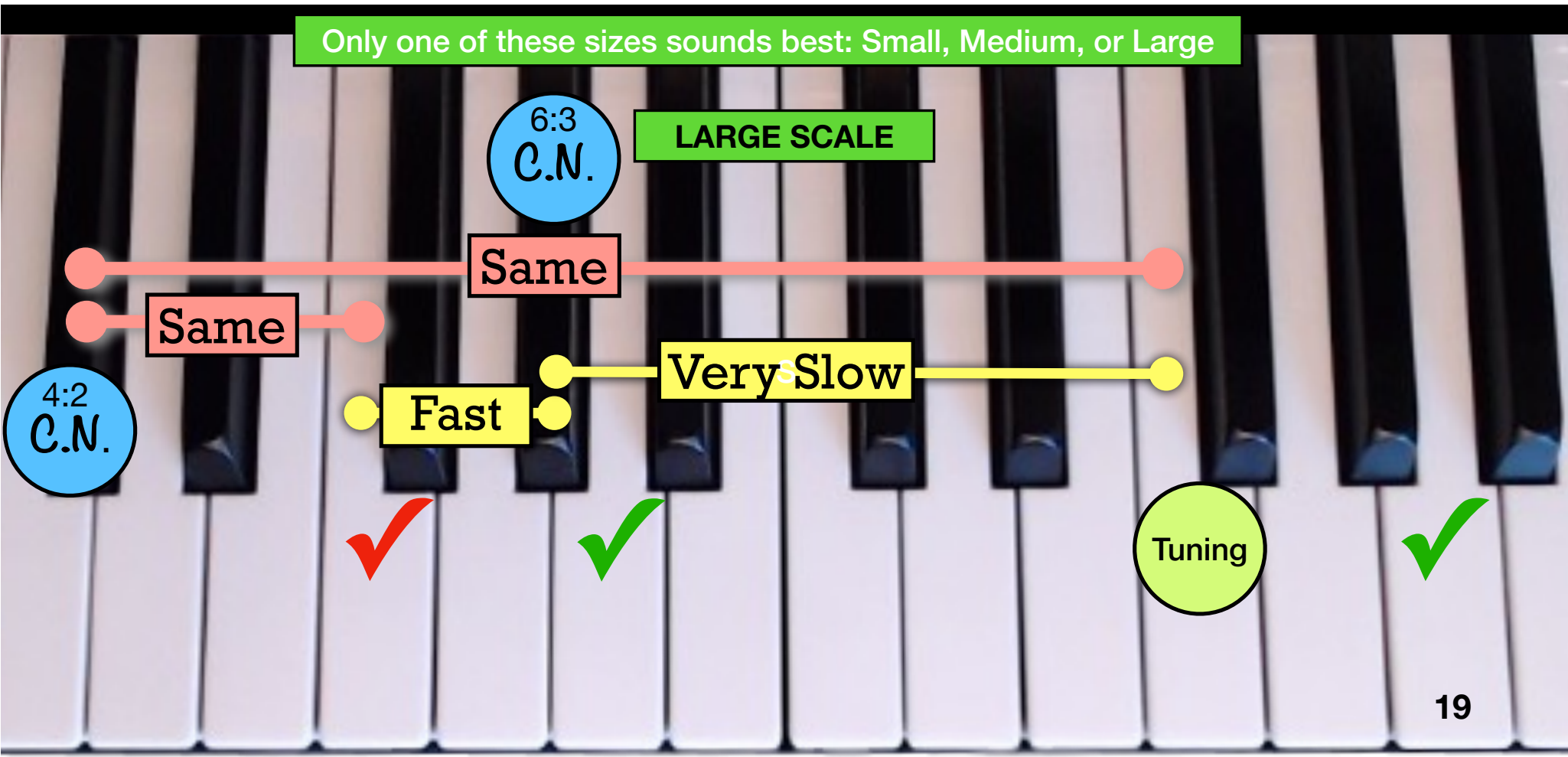
pure 4:2/very narrow 6:3 (**Large Scale**)  
C#3F3 = C#3F4 and F3G#4 >> G#4F4

F3F4 should be same size as A3A4  
If not, choose a size for the sequence

✓ Temporarily Tuned

-  Note Being Tuned
-  Already Tuned
-  Check Note

Only one of these sizes sounds best: Small, Medium, or Large



Now you should have an A3A4 and F3F4 octave that were both tuned as the same size. I.e. the F3F4 should have worked out as the same size as the A3A4.

If they are different sizes, choose one size for the temperament sequence.

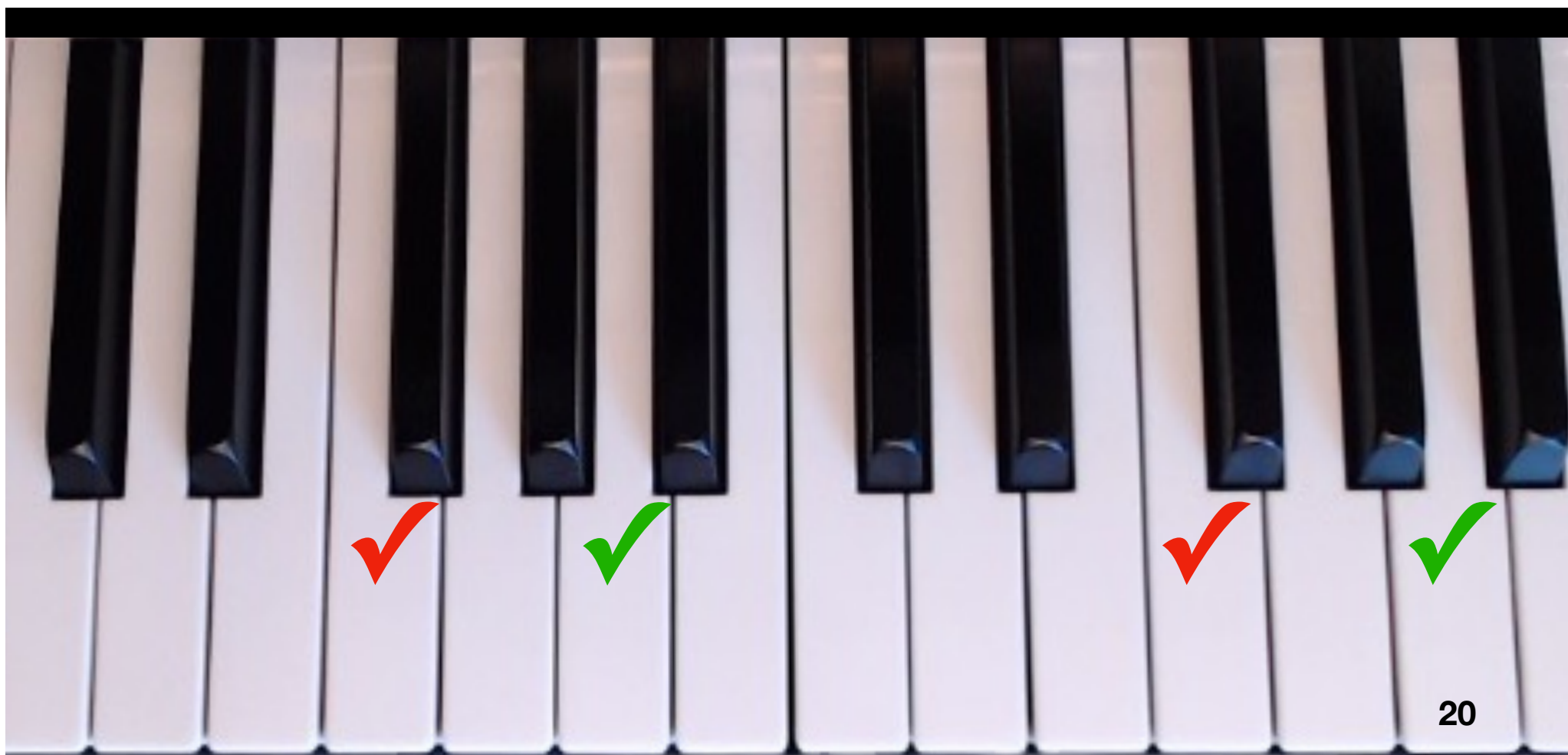
The A3 and A4 will be accurate, but F3 and F4 will be temporary because of the approximation of F3.

 Note Being Tuned

 Already Tuned

 Check Note

 Temporarily Tuned






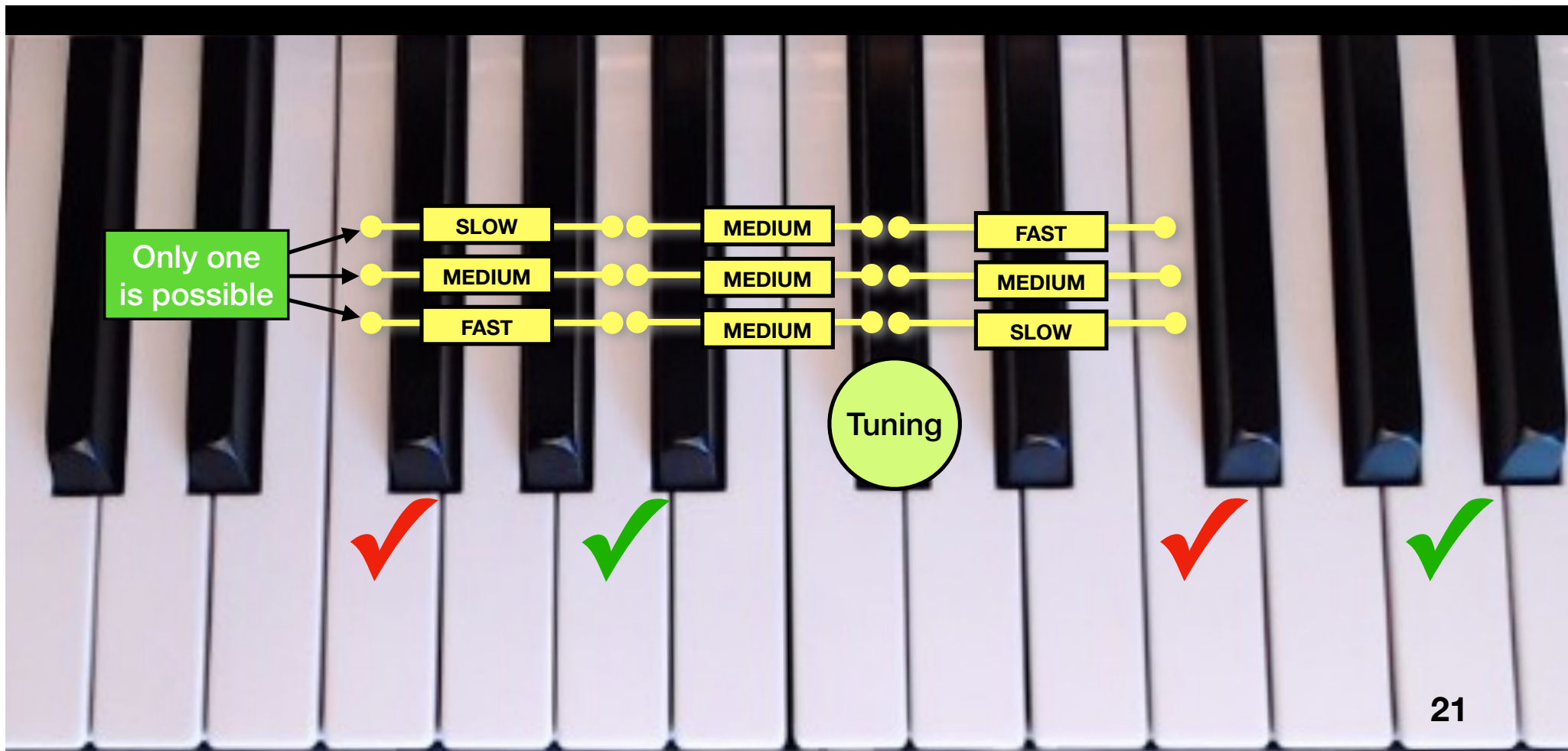
# C#4

## Lower Skeleton (F3A3-A3C#4-C#4F4)

Now we tune C#4 so that the Lower Skeleton M3's all change speed by the same amount. I.e. Slow-Medium-Fast, Fast-Medium-Slow, or Medium-Medium-Medium. Whatever works out. You can't force it. Ratios MUST be equal. This tunes an accurate C#4.

✓ Temporarily Tuned




-  Note Being Tuned
-  Already Tuned
-  Check Note



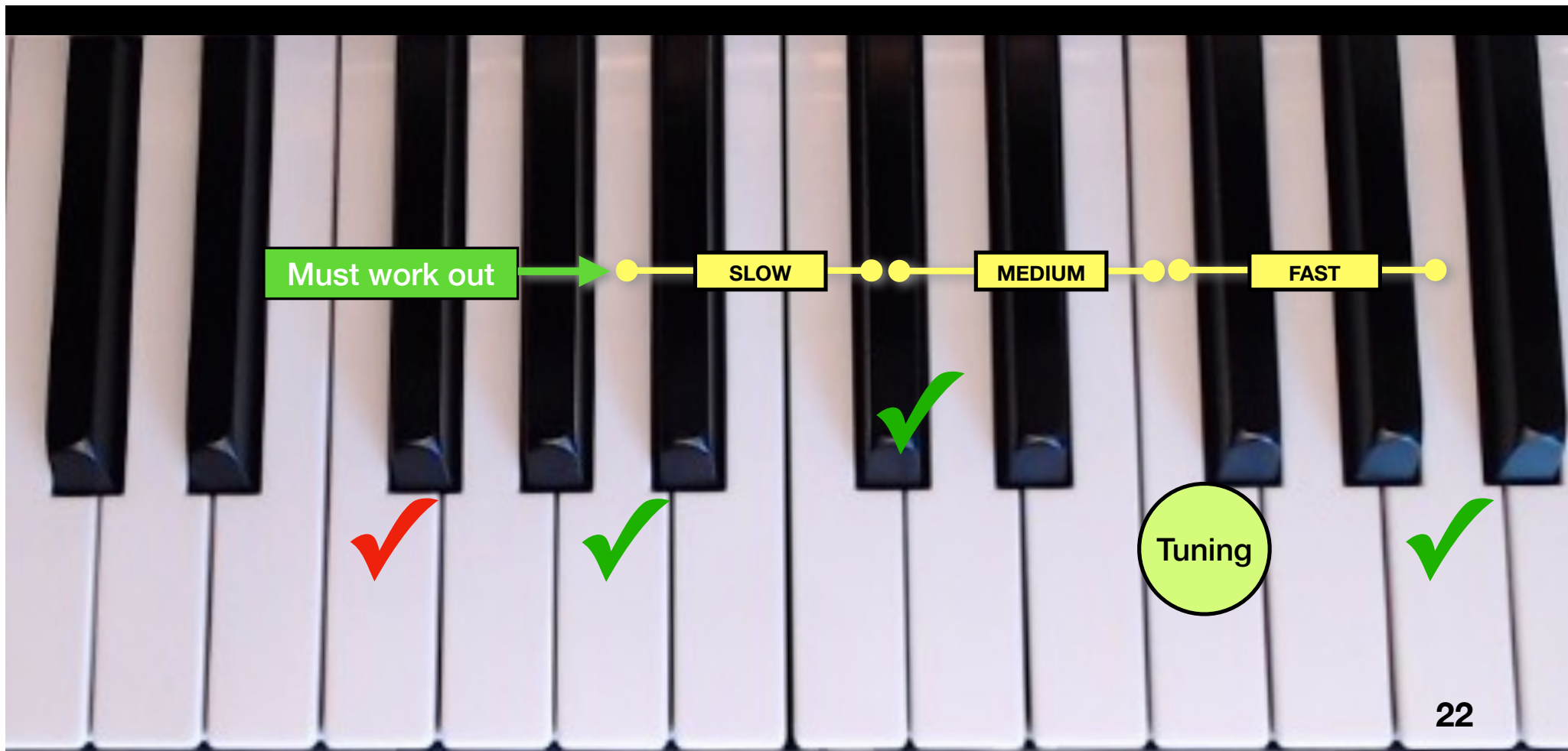
# F4

## Upper Skeleton (A3C#4-C#4F4-F4A4)

Retune F4. The Upper Skeleton M3's must all increase, Slow-Medium-Fast.  
Ratios MUST be equal. This will tune an accurate F4.


-  Note Being Tuned
-  Already Tuned
-  Check Note




 Temporarily Tuned

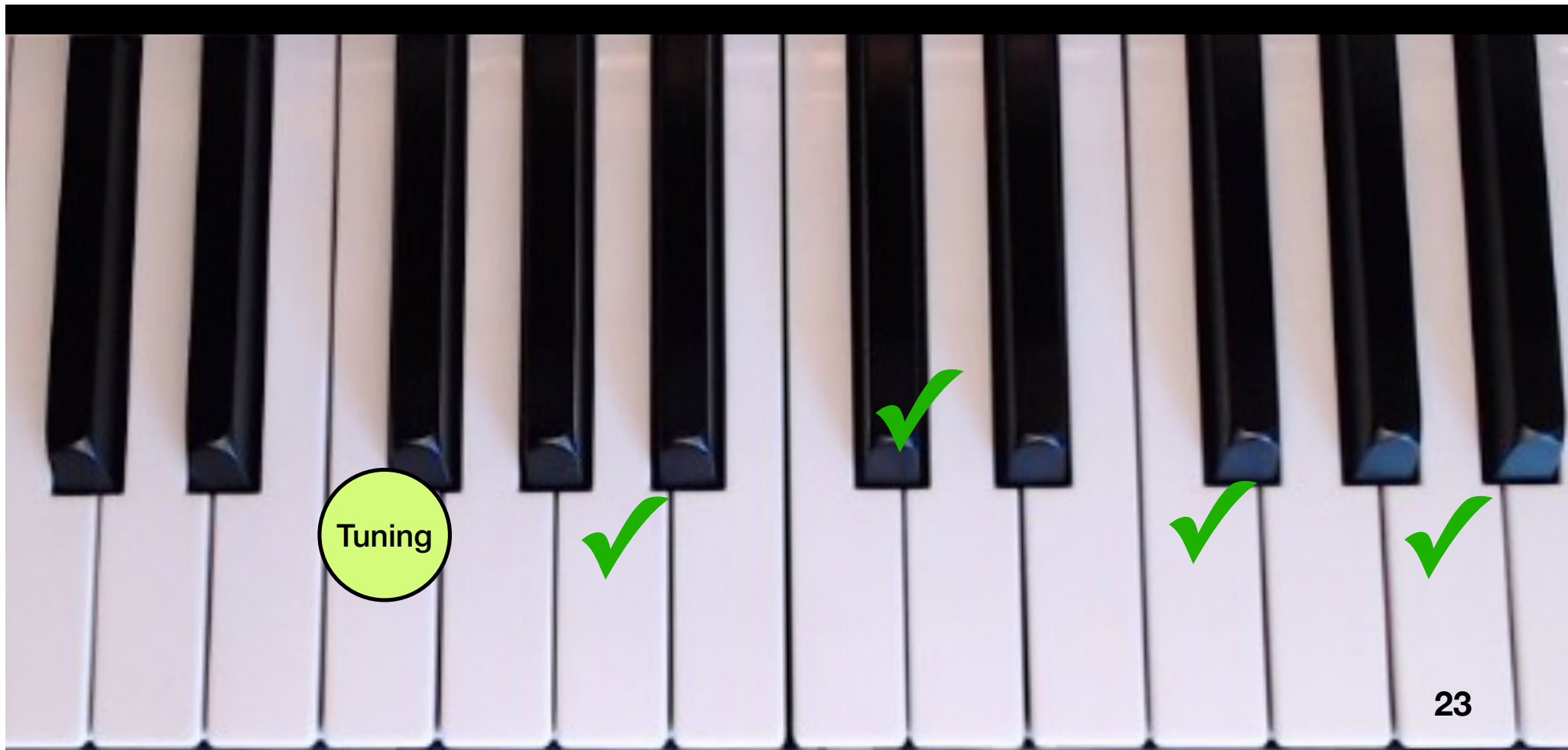


# F3

Now retune F3 so that F3F4 is the same size it was before, i.e. Small, Medium, or Large. The next pages show the tests for each size.

 Temporarily Tuned




-  Note Being Tuned
-  Already Tuned
-  Check Note



# F3

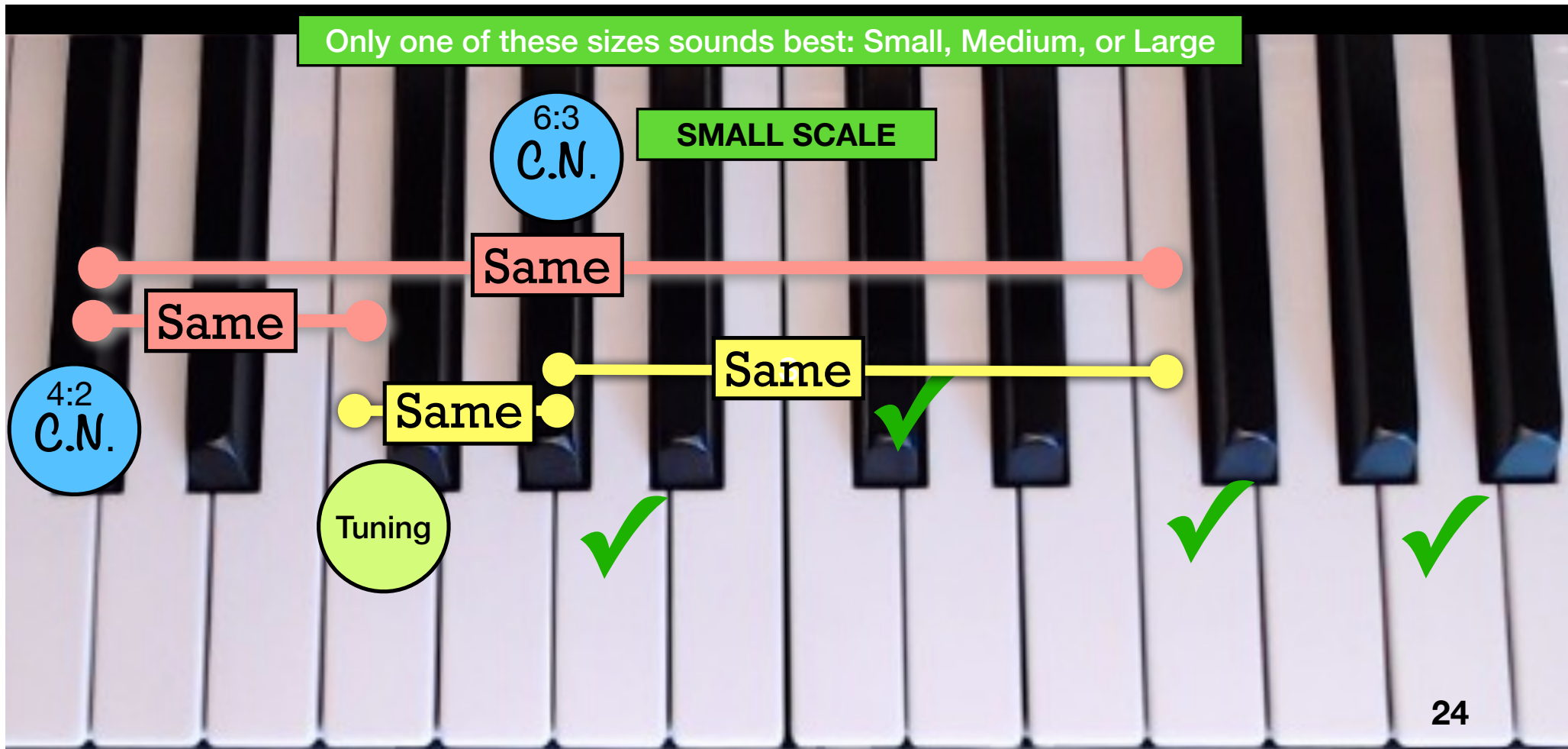
Tune F3F4 as a:

**Small Scale Octave.** Pure 4:2/Pure 6:3  
 $C\#3F3 = C\#3F4$  and  $F3G\#3 = G\#3F4$

-  Note Being Tuned
-  Already Tuned
-  Check Note

 Temporarily Tuned

Only one of these sizes sounds best: Small, Medium, or Large






**F3**

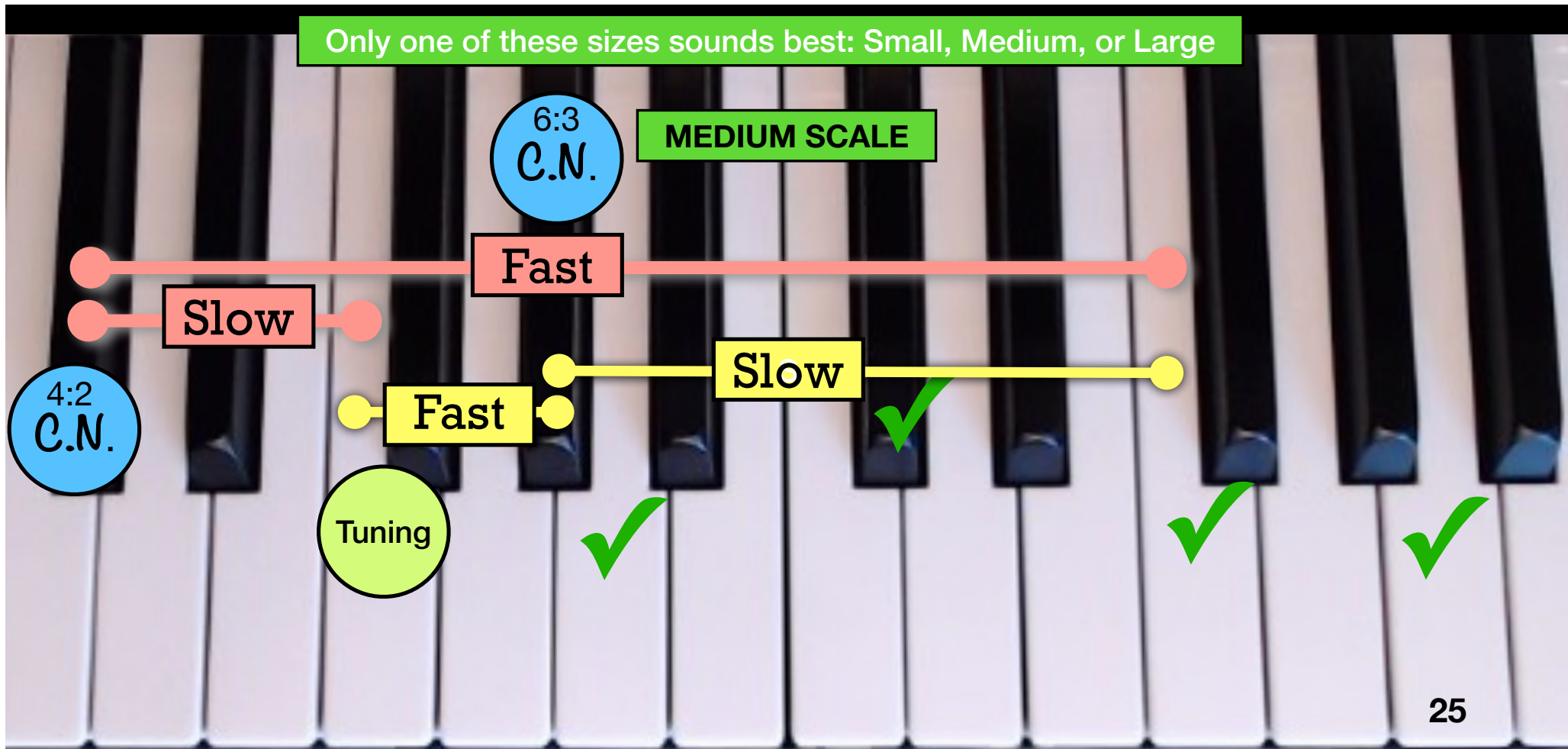
or

**Medium Scale Octave.** Wide 4:2/Narrow 6:3  
 $C\#3F3 < C\#3F4$  and  $F3G\#3 > G\#3F4$

✓ Temporarily Tuned

-  Note Being Tuned
-  Already Tuned
-  Check Note

Only one of these sizes sounds best: Small, Medium, or Large






# F3

or

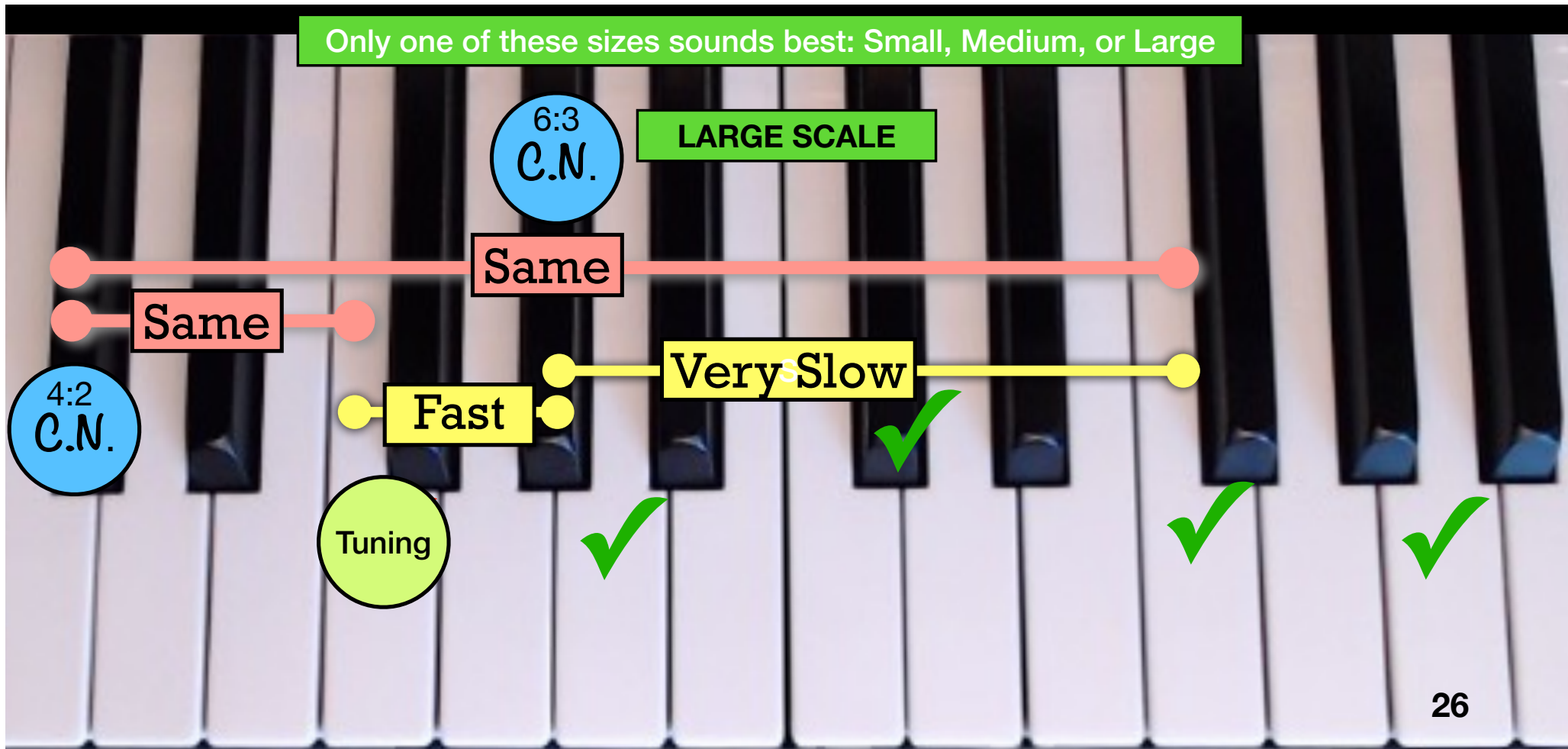
**Large Scale Octave.** Pure 4:2/Very Narrow 6:3  
 $C\#3F3 = C\#3F4$  and  $F3G\#3 \gg G\#3F4$

(Only one size is possible)

✓ Temporarily Tuned

-  Note Being Tuned
-  Already Tuned
-  Check Note

Only one of these sizes sounds best: Small, Medium, or Large



Now the Skeleton is tuned.

(No more temporary settings)

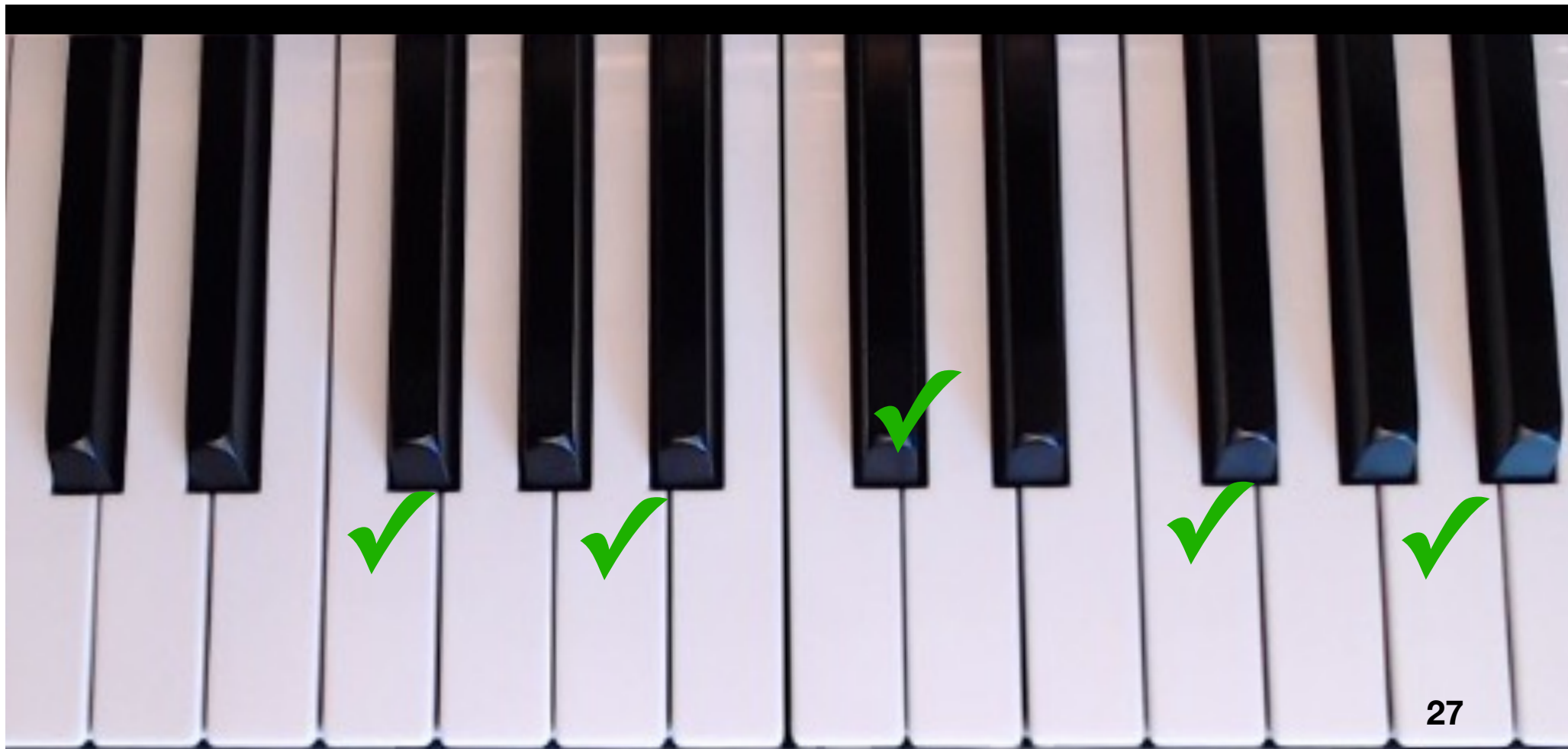
(No more check notes needed)



Note Being Tuned





Already Tuned

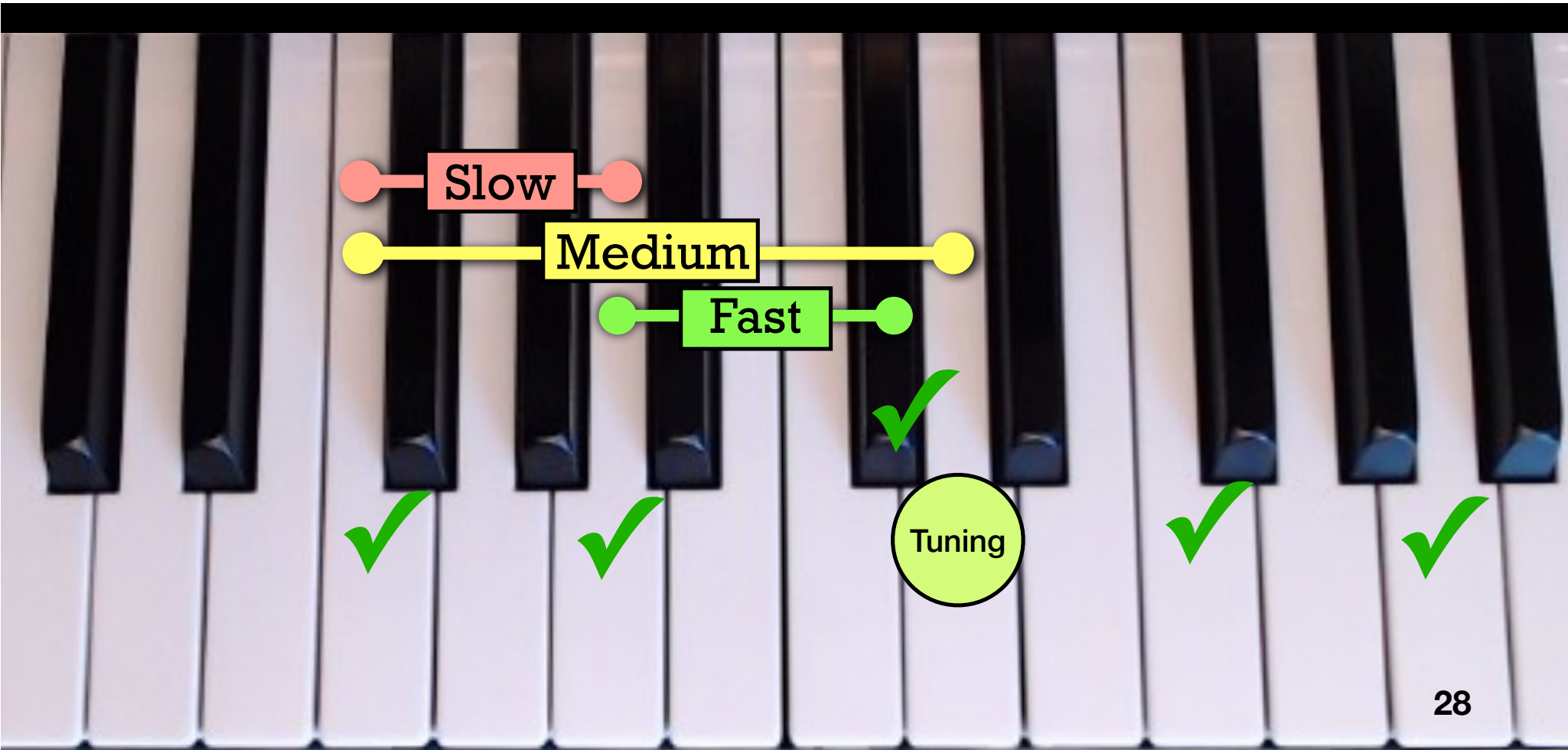


# D4

Now we tune **D4** so that;  
**F3A3 < F3D4 < A3C#4**

Make **F3D4** beat  
*exactly halfway between*  
**F3A3** and **A3C#4**

 Note Being Tuned  
 Already Tuned



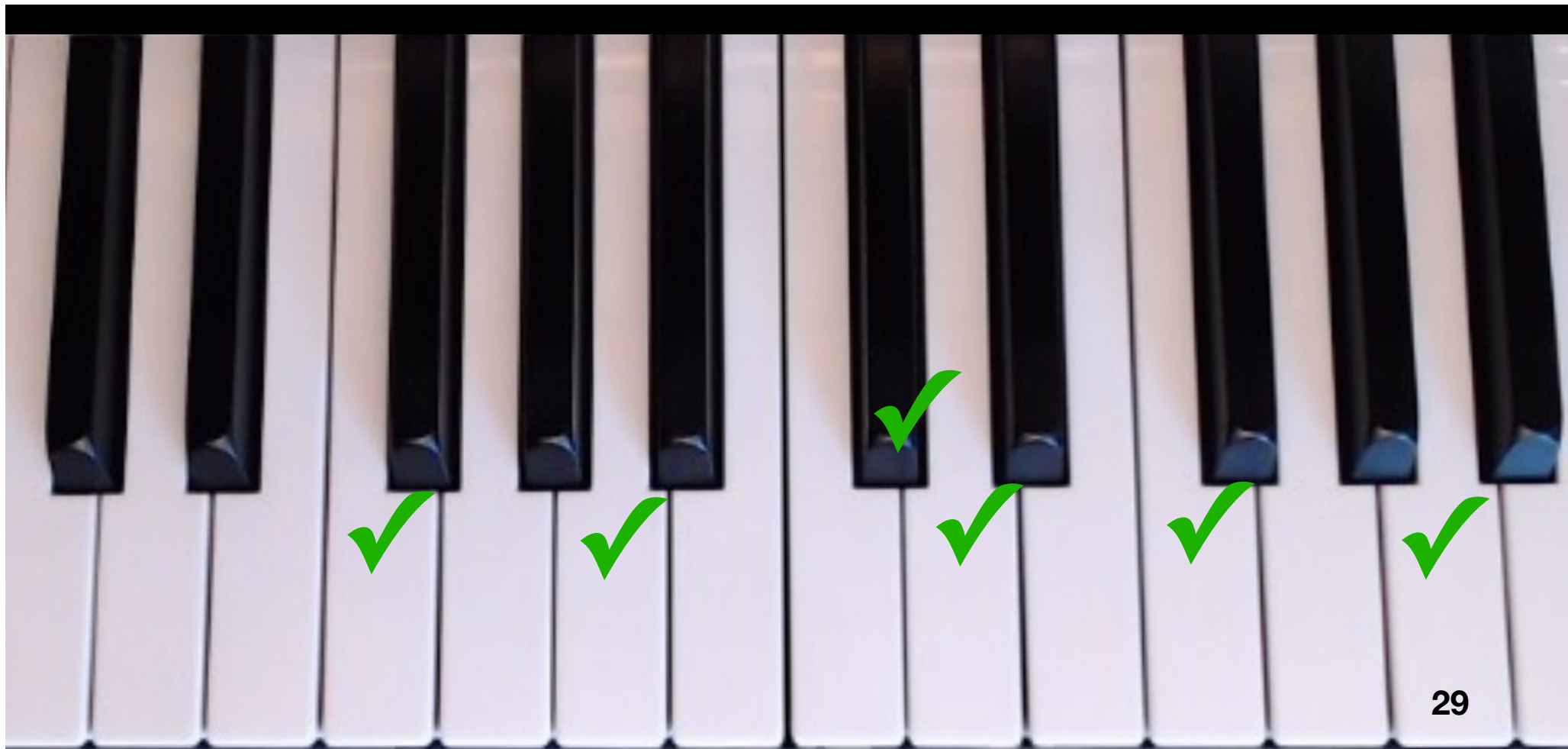
The preceding steps are common to all pianos.  
Now we choose the next steps to tune **F#3** and **A#3**  
based on the octave scale found when tuning **A3A4** and **F3F4**,  
i.e. Small, Medium, or Large.  
Use only one sequence, then skip to **The Common Finish**



Note Being Tuned



Already Tuned





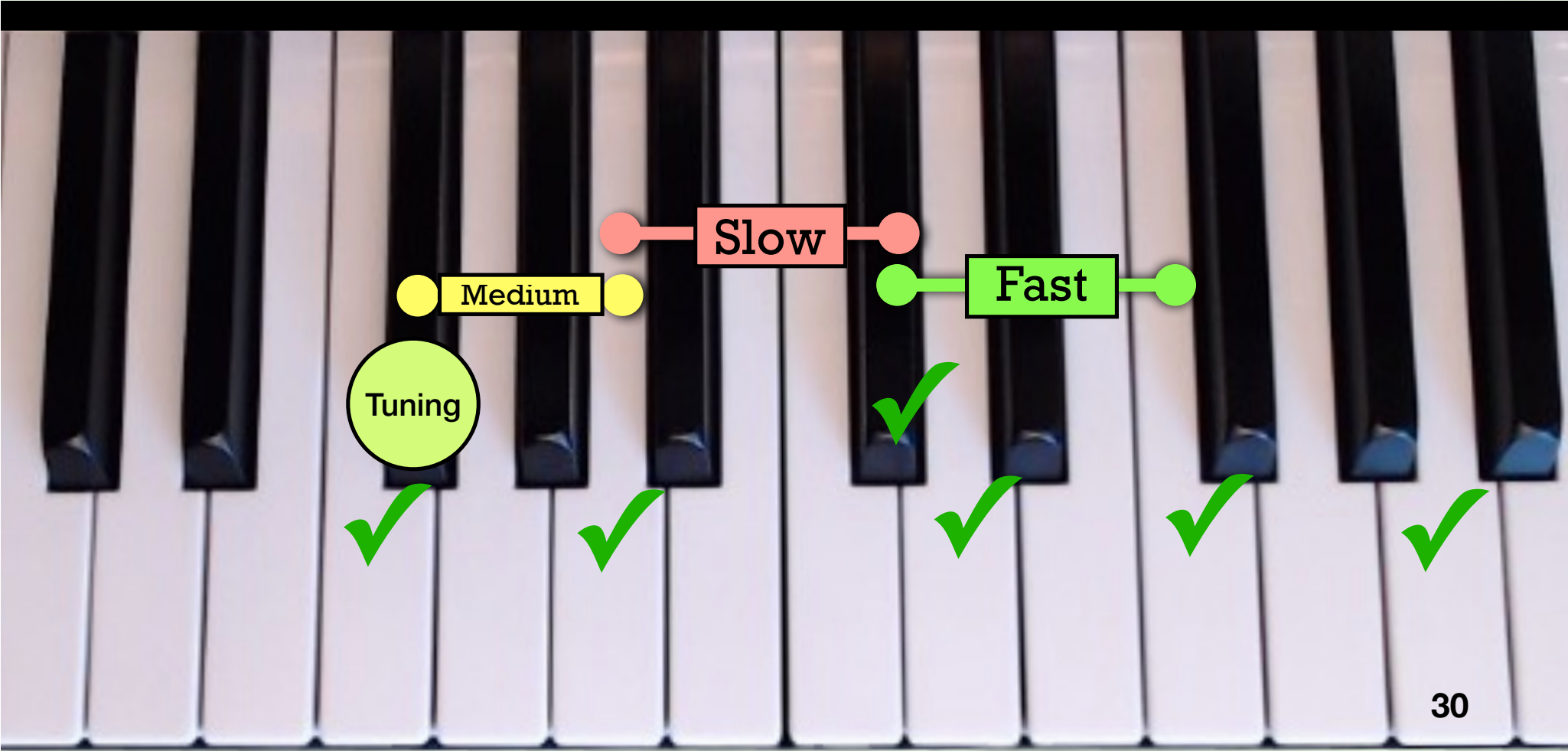
# F#3

## SMALL SCALE SEQUENCE for Tuning F#3A#3 (Pure 4:2/Pure 6:3)

Tune **F#3** so that;  
**A3C#4 < F#3A3 < C#4F4**

Make **F#3A3** beat  
*exactly halfway between*  
**A3C#4** and **C#4F4**

 Note Being Tuned  
 Already Tuned





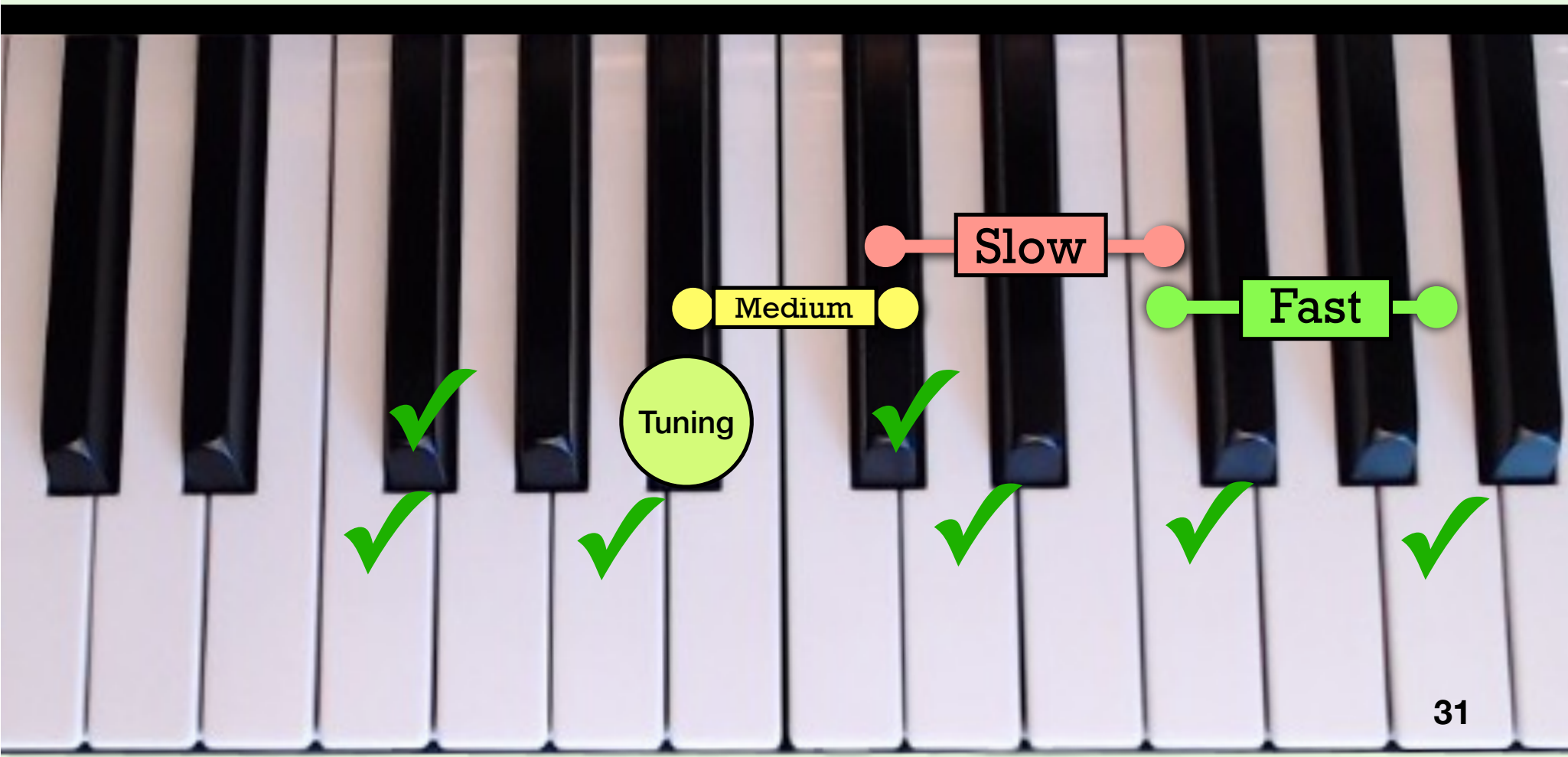
# A#3

## SMALL SCALE SEQUENCE for Tuning F#3A#3 (Pure 4:2/Pure 6:3)

Tune **A#3** so that;  
**C#4F4 < A#3C#4 < F4A4**

Make **A#3C#4** beat  
*exactly halfway between*  
**C#4F4 and F4A4**



 Note Being Tuned  
 Already Tuned

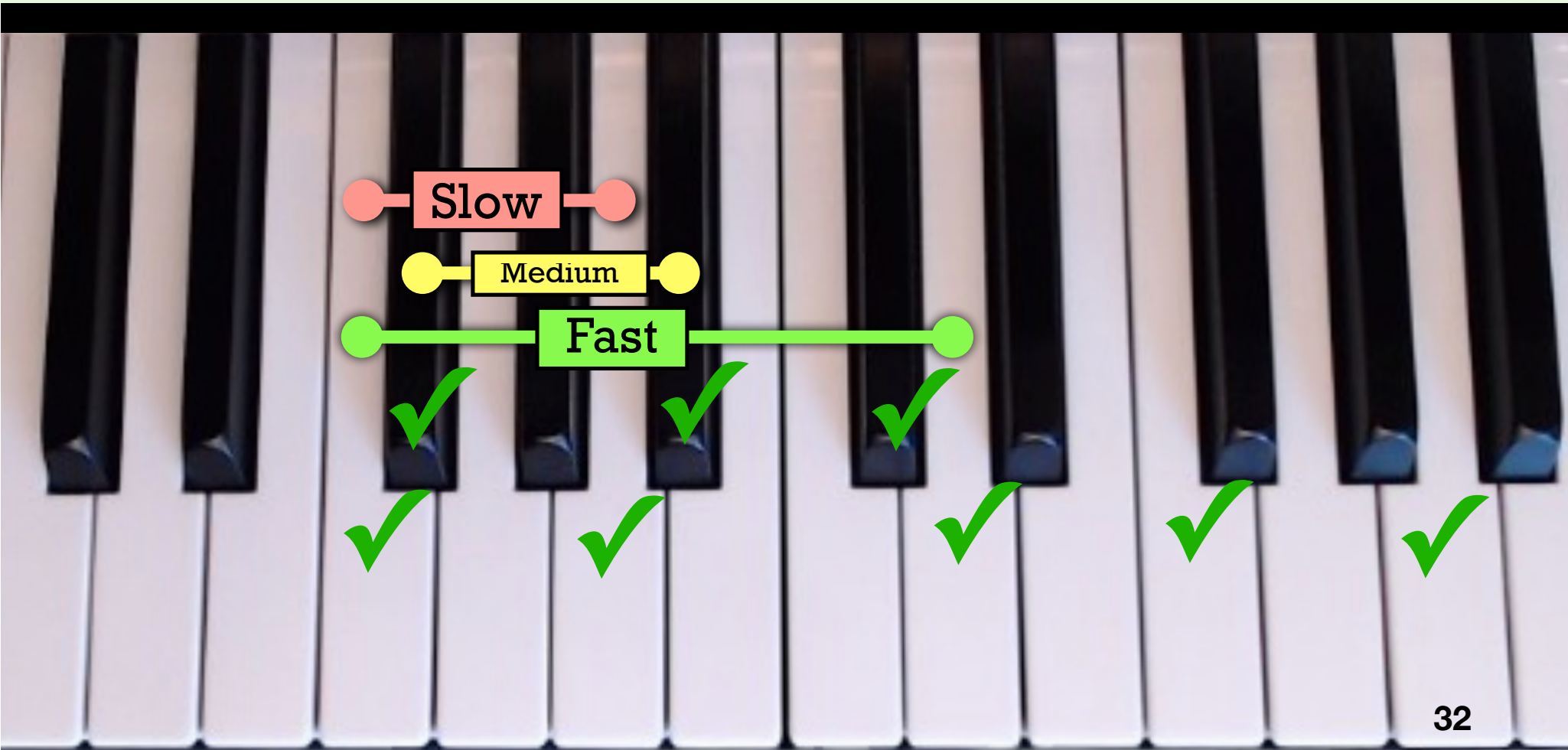


**SMALL SCALE SEQUENCE for Tuning F#3A#3**  
(Pure 4:2/Pure 6:3)

Check:  
 $F3A3 < F\#3A\#3 < F3D4$

Check that **F#3A#3** beats  
*exactly halfway between*  
**F3A3** and **F3D4**



 Note Being Tuned  
 Already Tuned

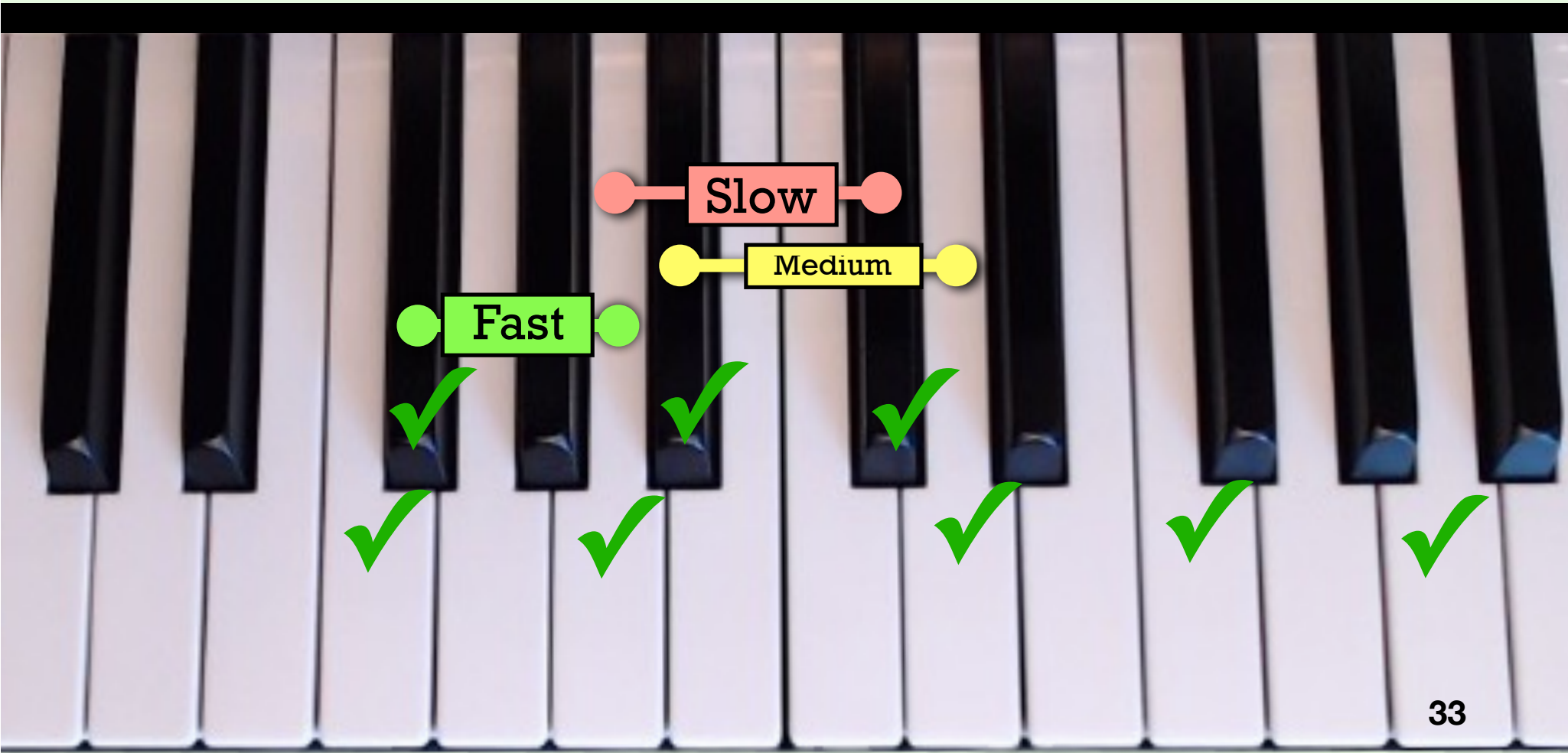


**SMALL SCALE SEQUENCE for Tuning F#3A#3**  
(Pure 4:2/Pure 6:3)

Check:  
**A3C#4 < A#3D4 < F#3A3**

Check that **A#3D4** beats  
*exactly halfway* between  
**A3C#4** and **F#3A3**

 Note Being Tuned  
 Already Tuned





# G#3

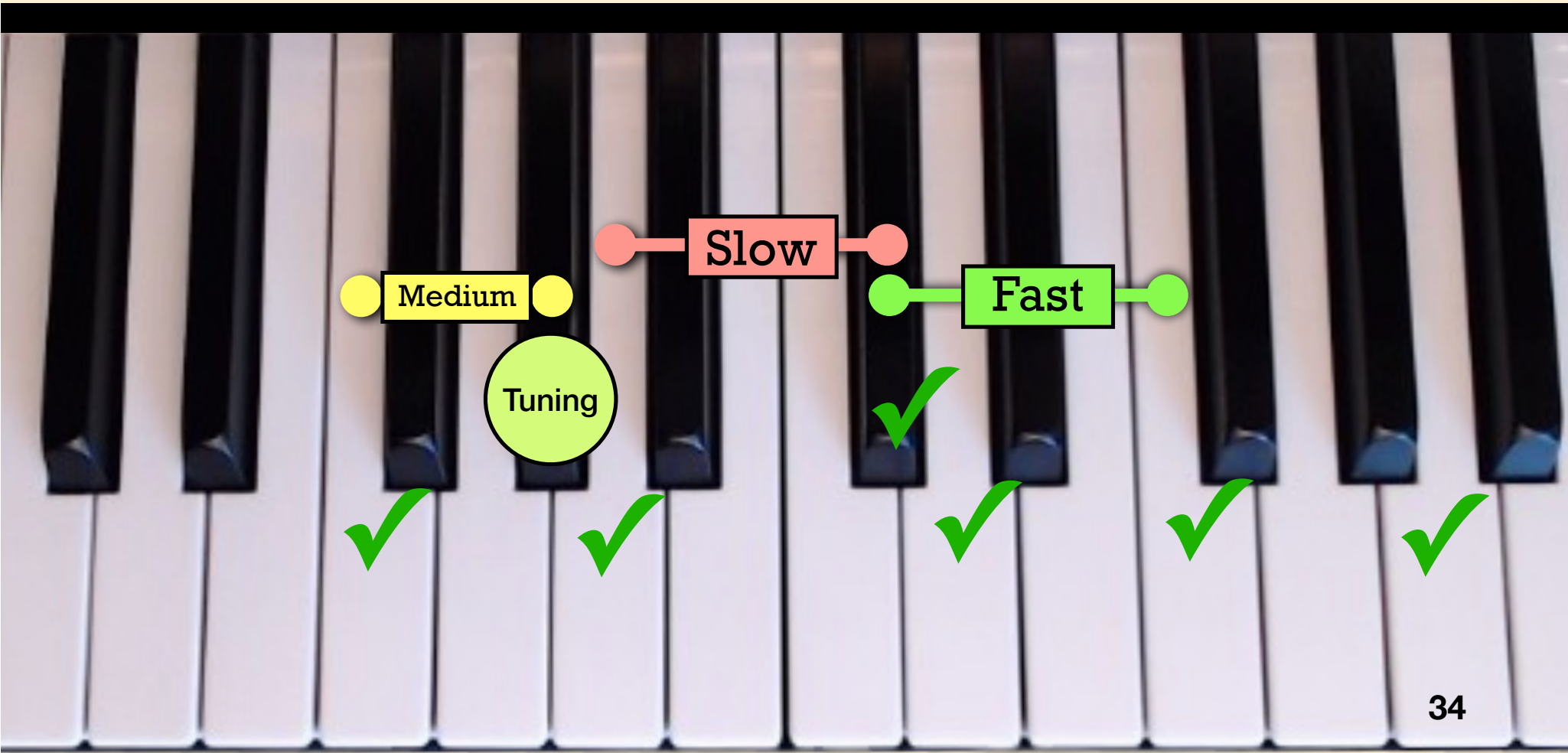
## MEDIUM SCALE SEQUENCE for Tuning F#3A#3

(Wide 4:2/Narrow 6:3)

Tune **G#3** so that;  
**A3C#4 < F3G#3 < C#4F4**

Make **F3G#3** beat  
*exactly halfway between*  
**A3C#4 and C#4F4**

 Note Being Tuned  
 Already Tuned





# C4

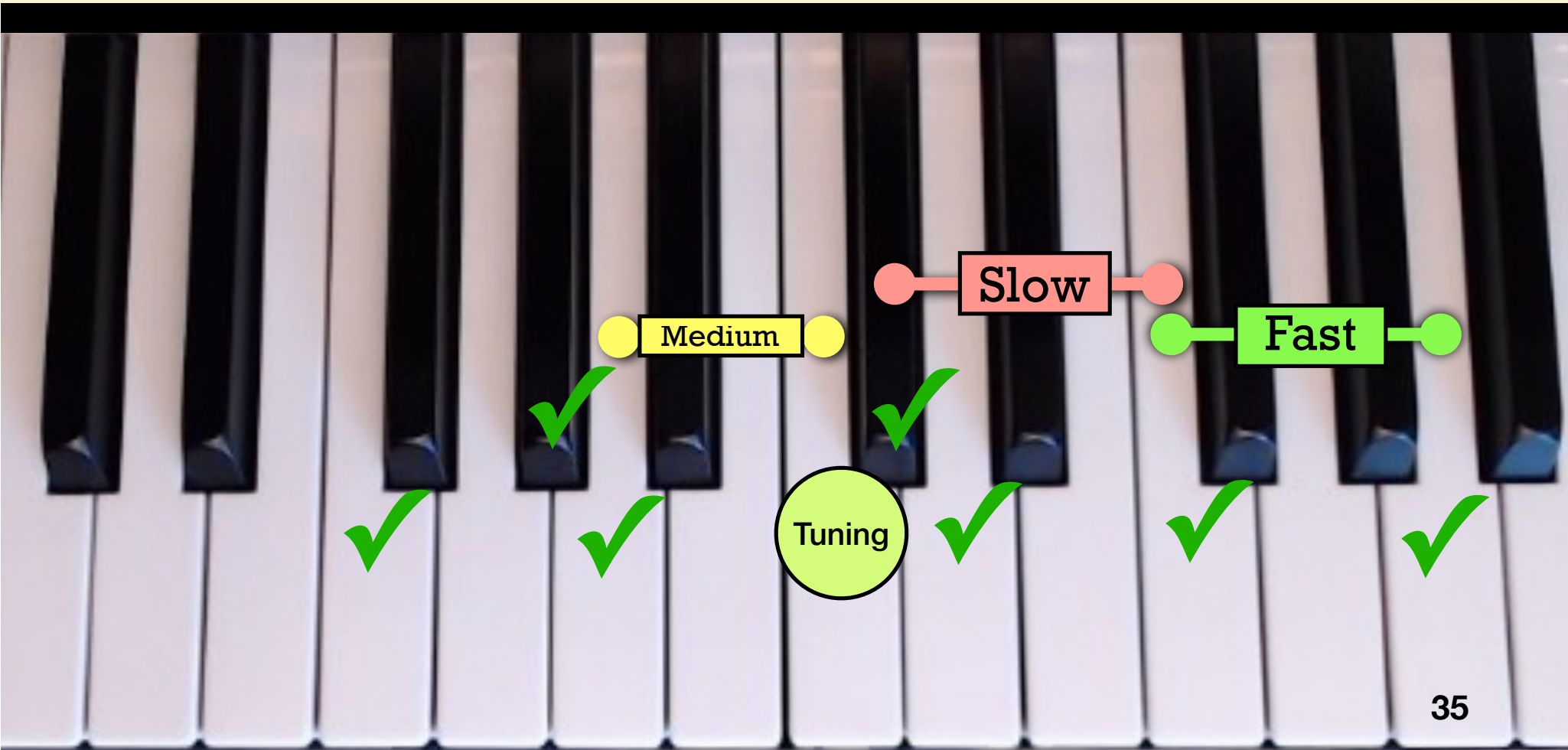
## MEDIUM SCALE SEQUENCE for Tuning F#3A#3

(Wide 4:2/Narrow 6:3)

Tune **C4** so that;  
**C#4F4 < A3C4 < F4A4**

Make **F3G#3** beat  
*exactly halfway between*  
**A3C#4 and C#4F4**

 Note Being Tuned  
 Already Tuned





# A#3

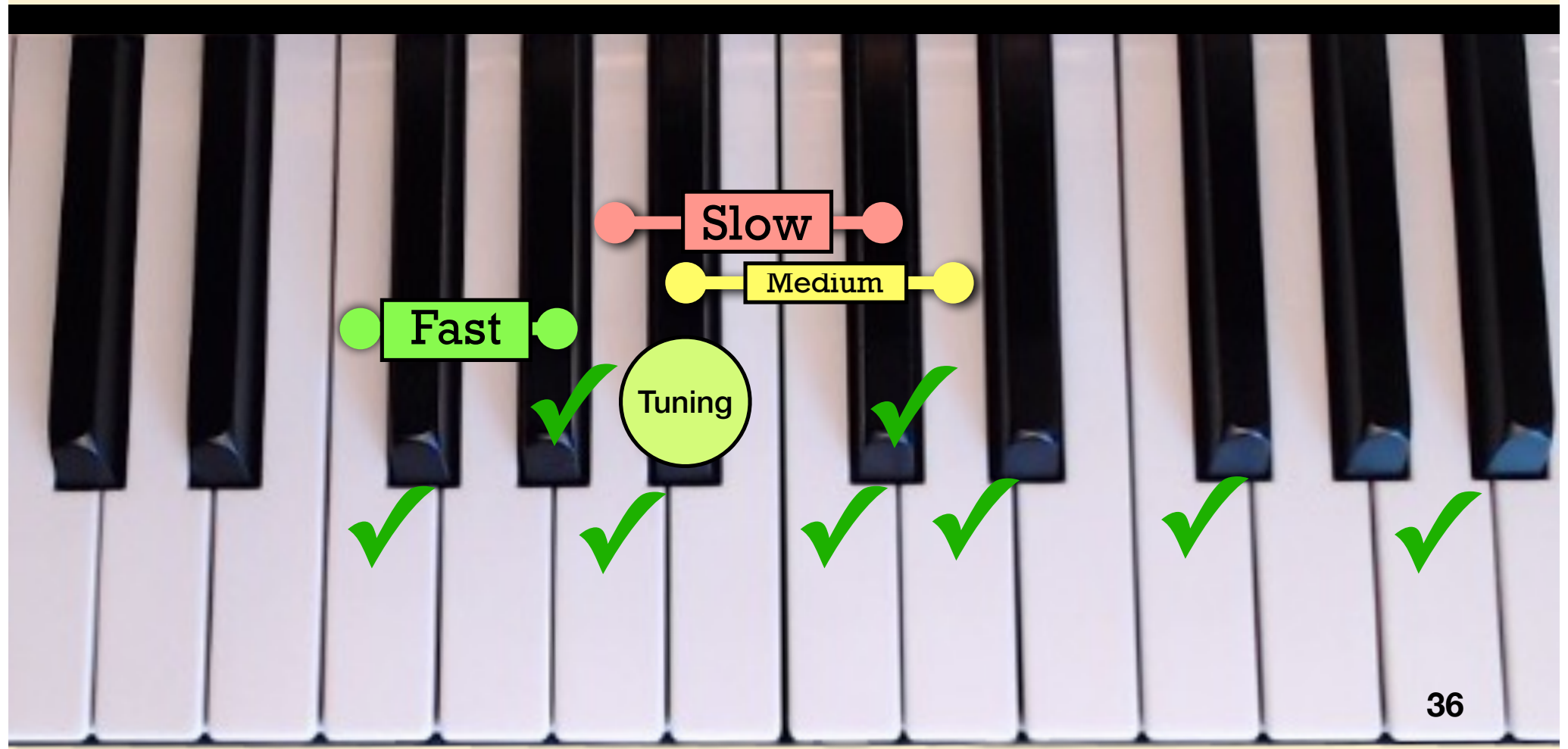
## MEDIUM SCALE SEQUENCE for Tuning F#3A#3

(Wide 4:2/Narrow 6:3)

Tune **A#3** so that;  
**A3C#4 < A#3D4 < F3G#3**

Make **A#3D4** beat  
*exactly halfway* between  
**A3C#4** and **F3G#3**

 Note Being Tuned  
 Already Tuned





# F#3

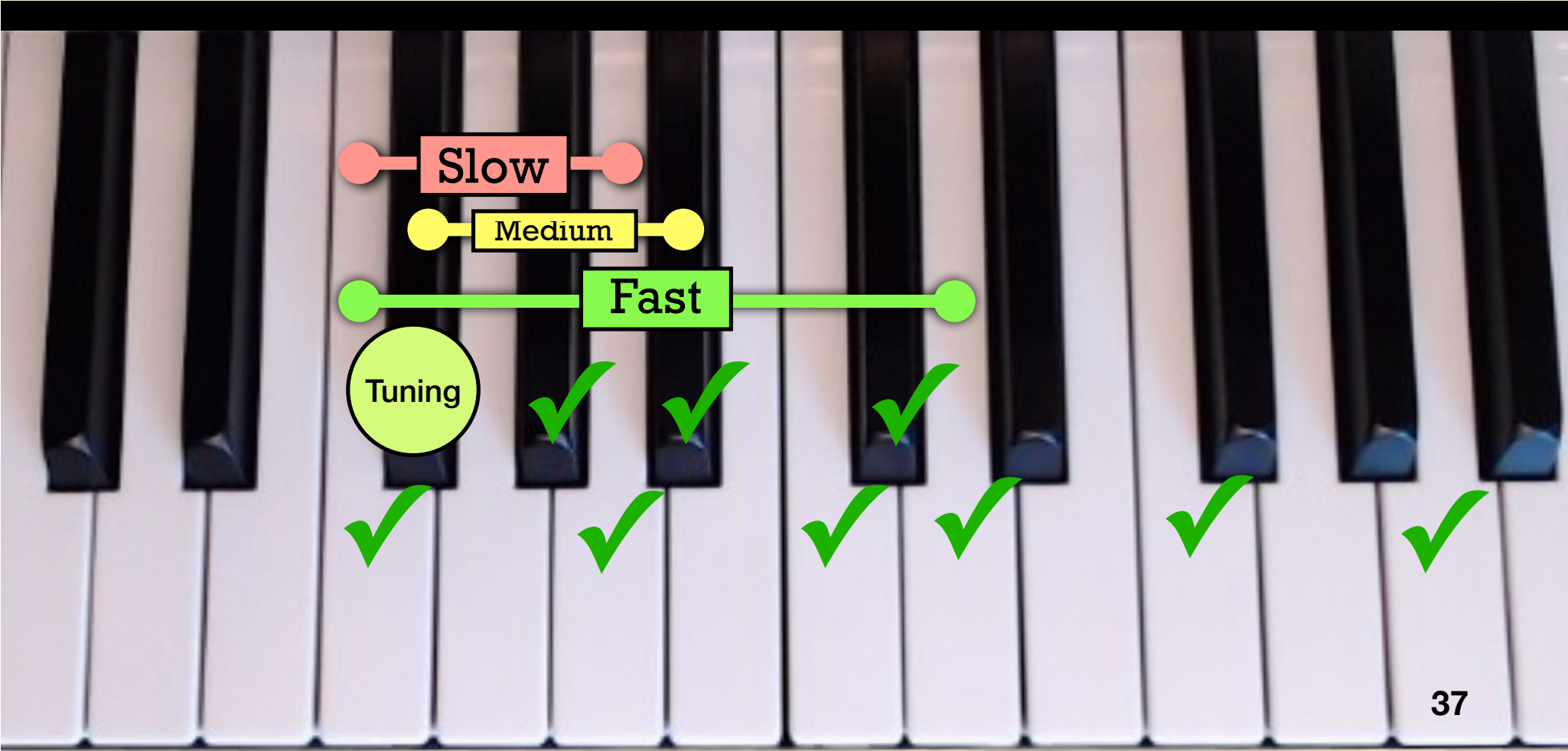
## MEDIUM SCALE SEQUENCE for Tuning F#3A#3

(Wide 4:2/Narrow 6:3)

Tune **F#3** so that;  
**F3A3 < F#3A#3 < F3D4**

Make **F#3A#3** beat  
*exactly halfway between*  
**F3A3 and F3D4**

 Note Being Tuned  
 Already Tuned



## MEDIUM SCALE SEQUENCE for Tuning F#3A#3

(Wide 4:2/Narrow 6:3)

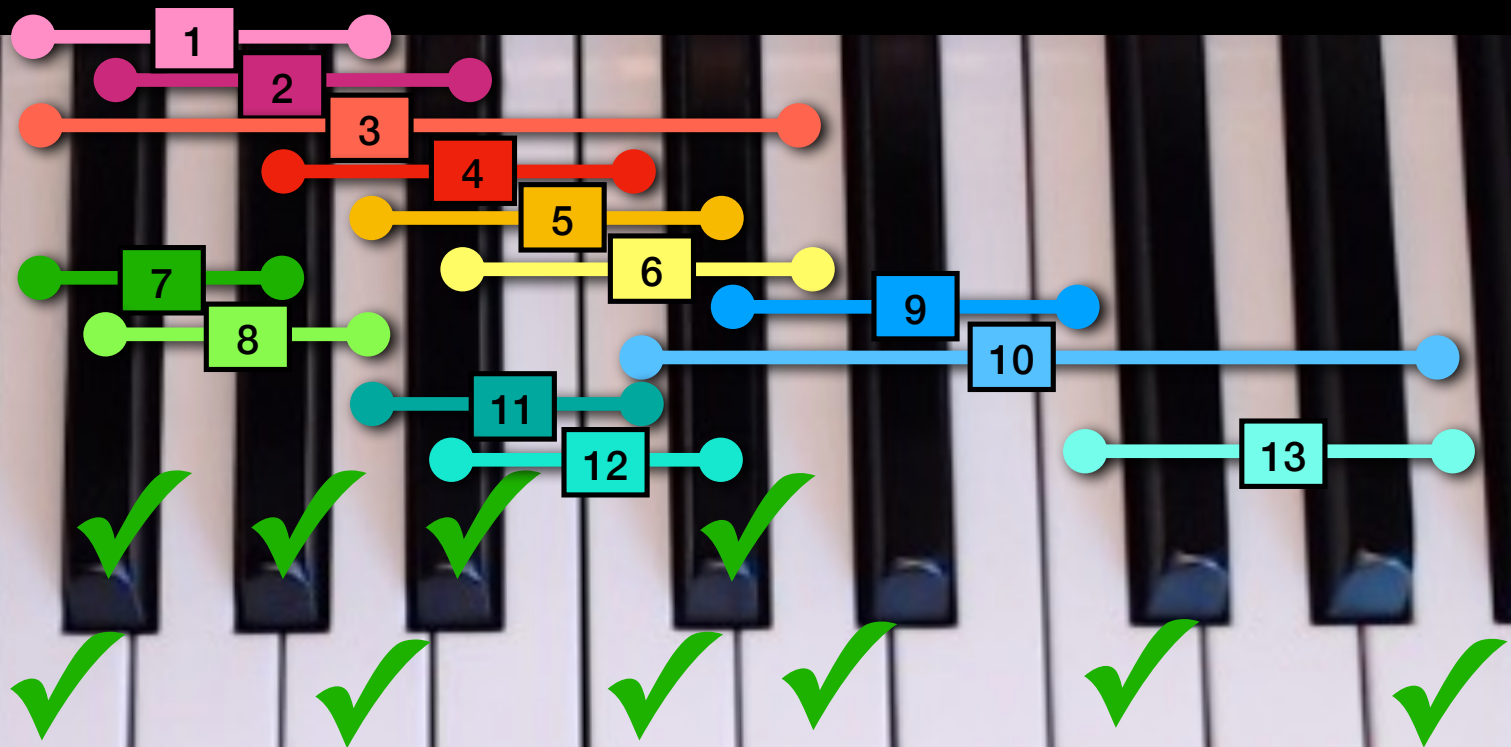
Check that these interval all increase in speed evenly.



Note Being Tuned



Already Tuned





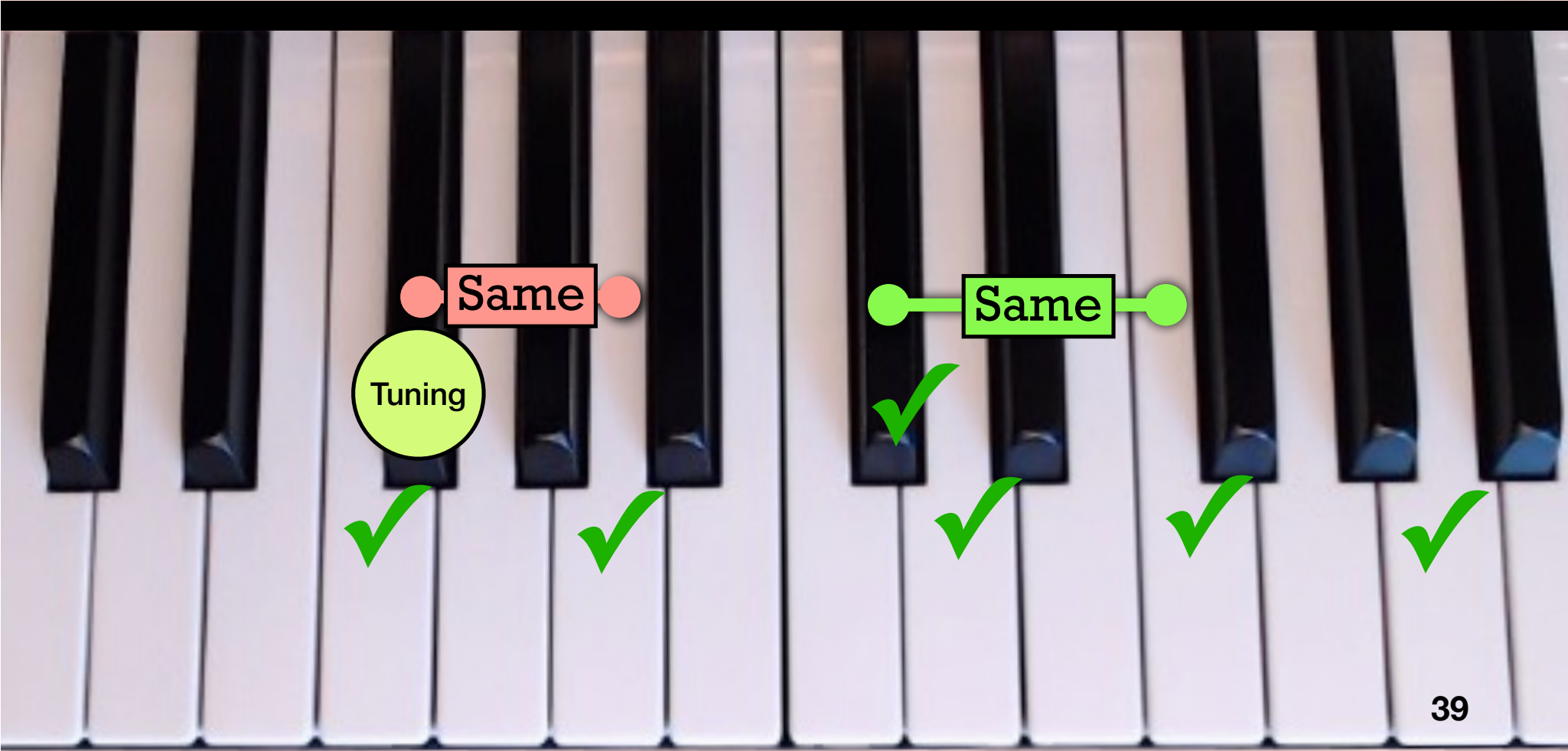
# F#3

## LARGE SCALE SEQUENCE for Tuning F#3A#3

(Pure 4:2/Very Narrow 6:3)

Tune **F#3** so that;  
**F#3A3 = C#4F4**

 Note Being Tuned  
 Already Tuned





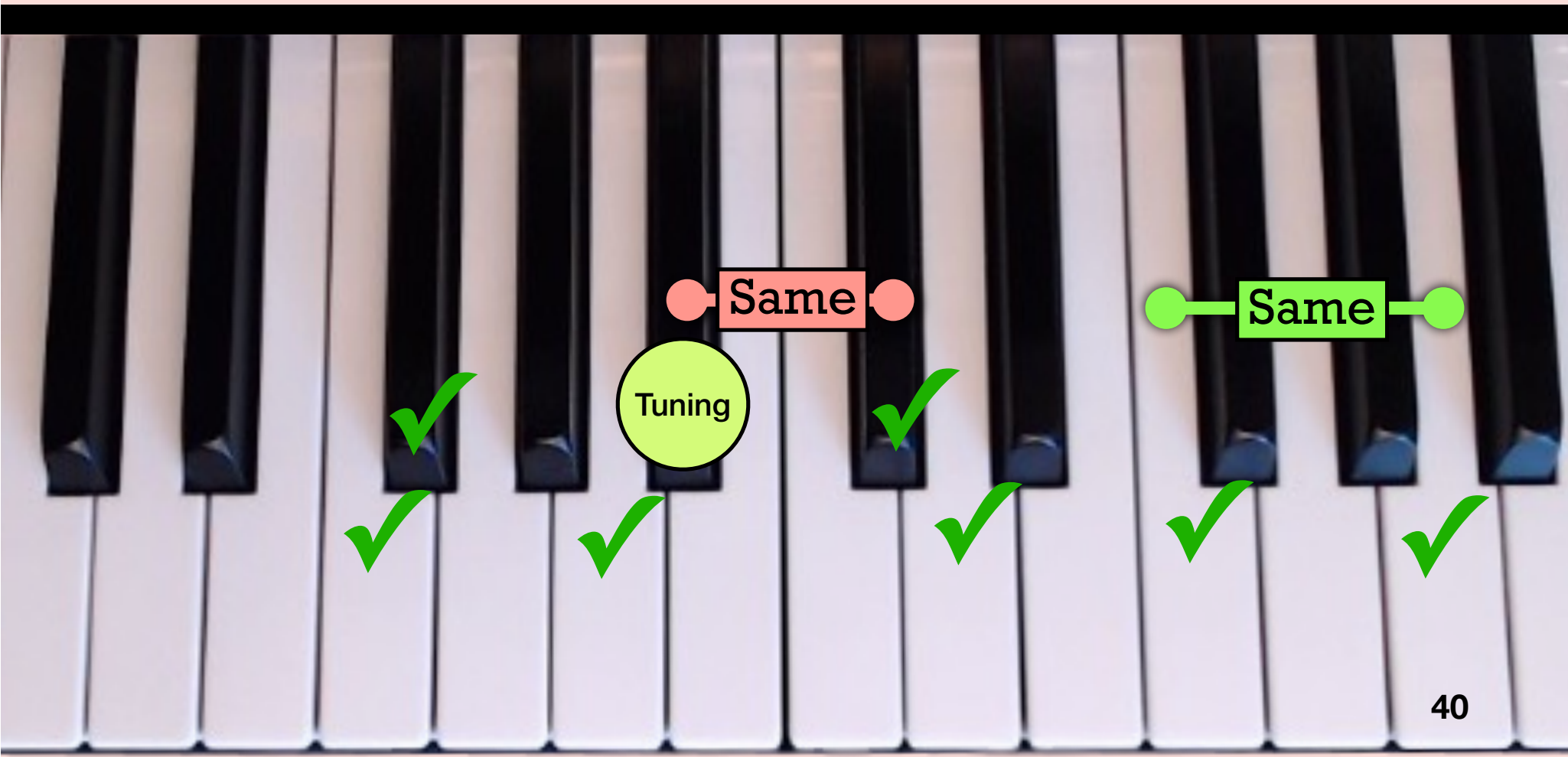
# A#3

## LARGE SCALE SEQUENCE for Tuning F#3A#3

(Pure 4:2/Very Narrow 6:3)

Tune **A#3** so that;  
**A#3C#4 = F4A4**

 Note Being Tuned  
 Already Tuned





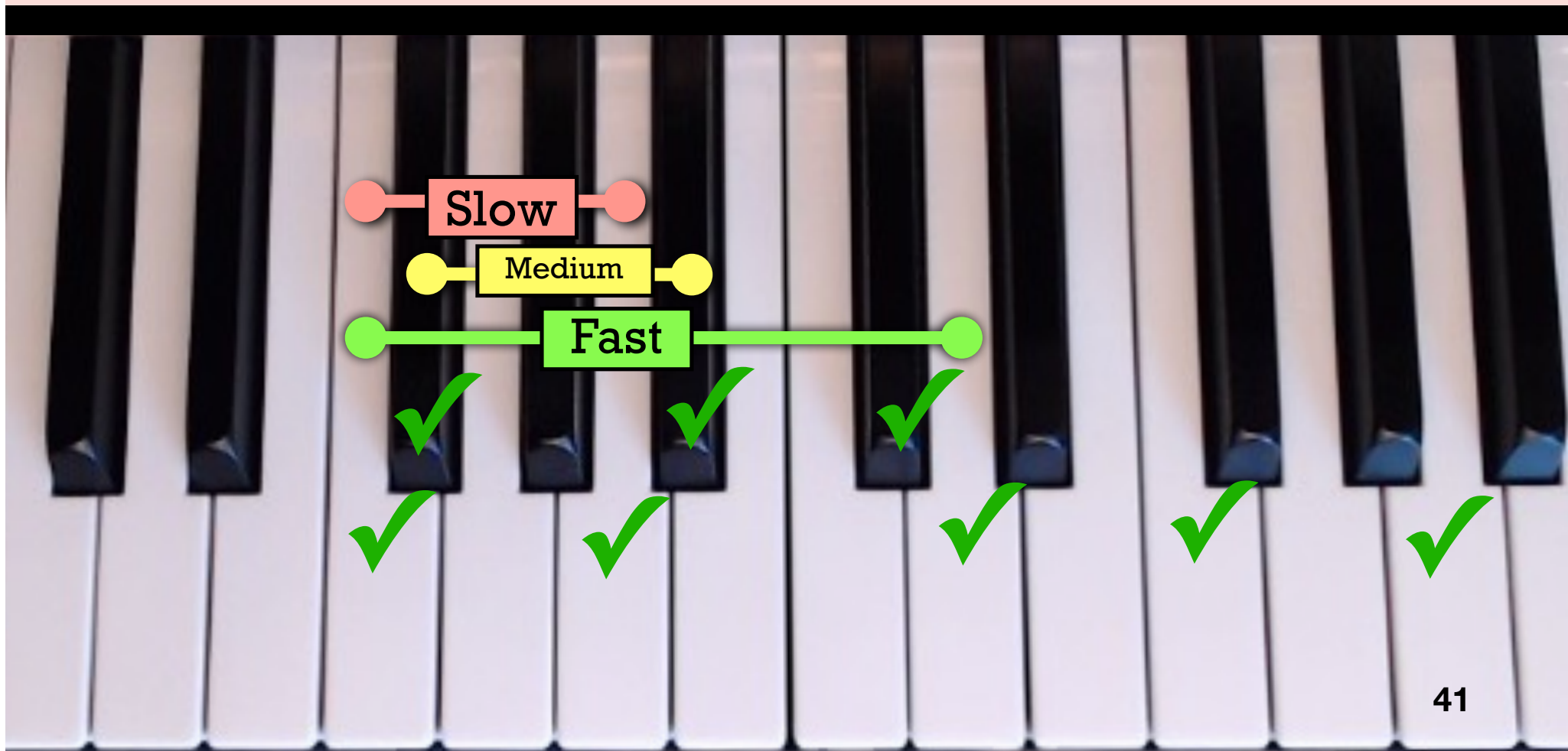
## LARGE SCALE SEQUENCE for Tuning F#3A#3

(Pure 4:2/Very Narrow 6:3)



Check:  
 $F3A3 < F\#3D4 < F3AD4$

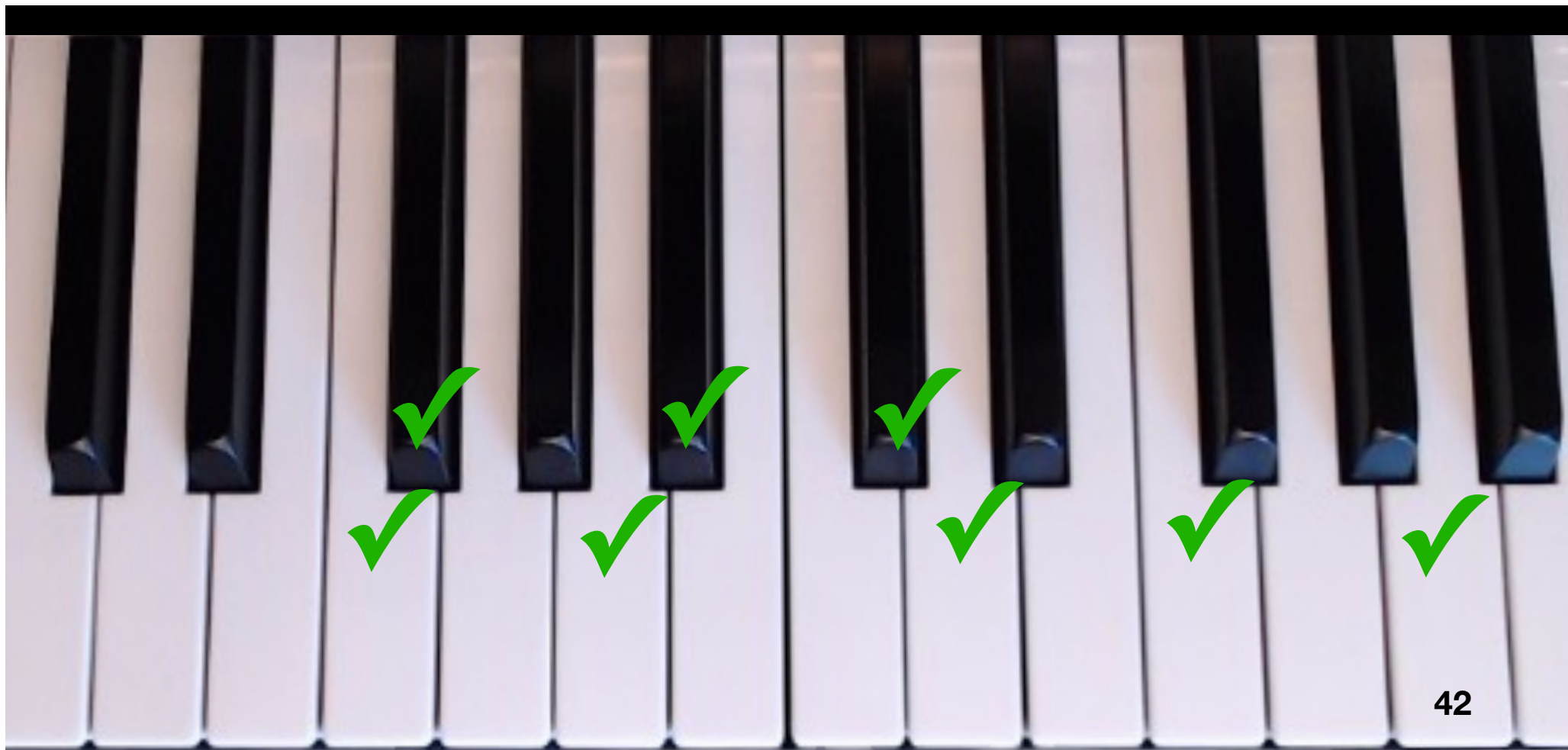
Check that **F#3A#3** beats  
*exactly halfway between*  
**F3A3** and **F3D4**

 Note Being Tuned  
 Already Tuned



Now **F#3** and **A#3** are tuned.

 Note Being Tuned  
 Already Tuned





# D#4

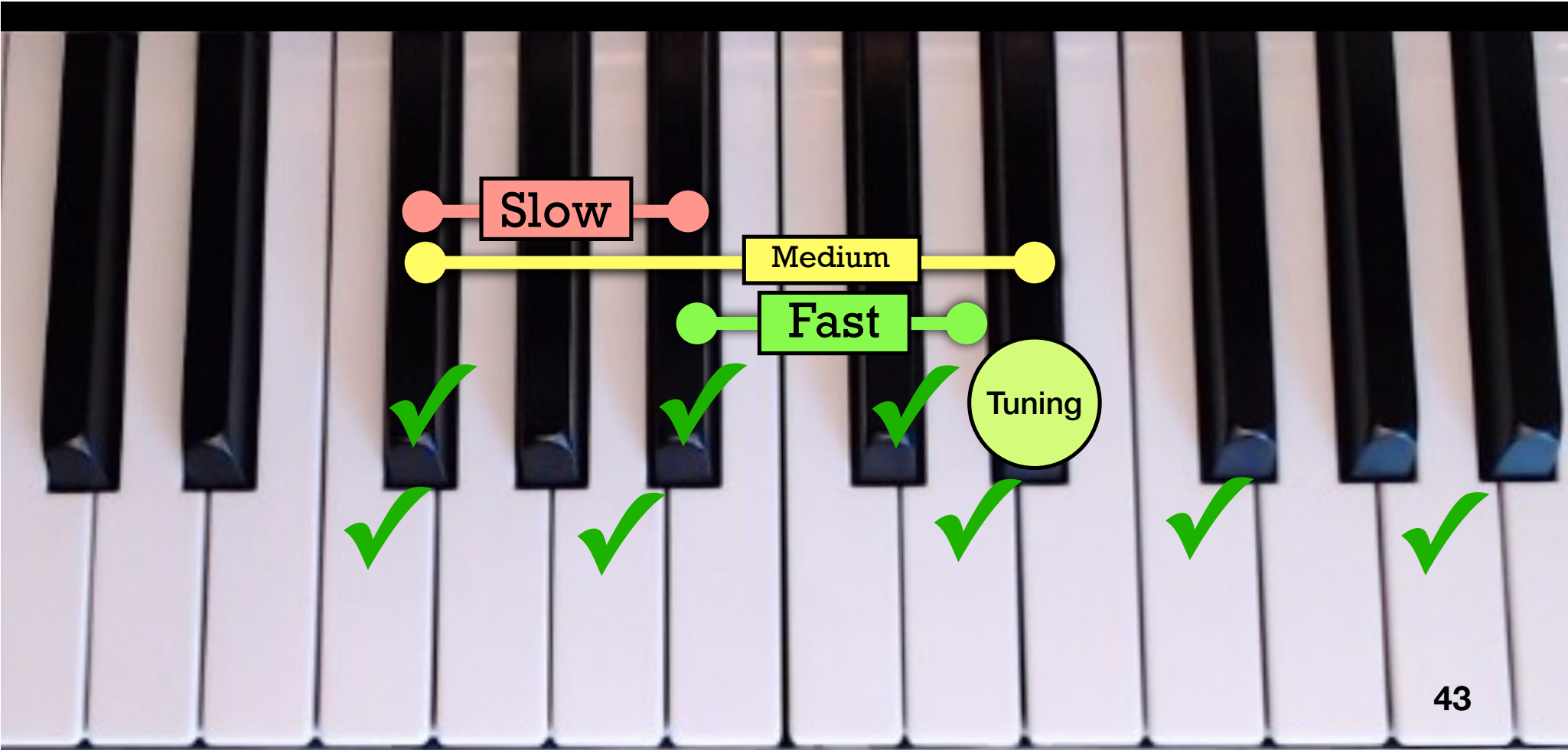
**MODIFICATION:** Because the M3/M6 equality isn't perfect, we can end up with some accumulated error. Here it is ok and even preferred if we tune F#3D#4 closer to A#3D4

The Common Finish

Tune **D#3** so that;  
 $F\#3A\#3 < F\#3D\#4 < A\#3D4$

Make **F#3D#4** beat  
*exactly halfway between*  
**F#3A#3** and **A#3D4**

 Note Being Tuned  
 Already Tuned





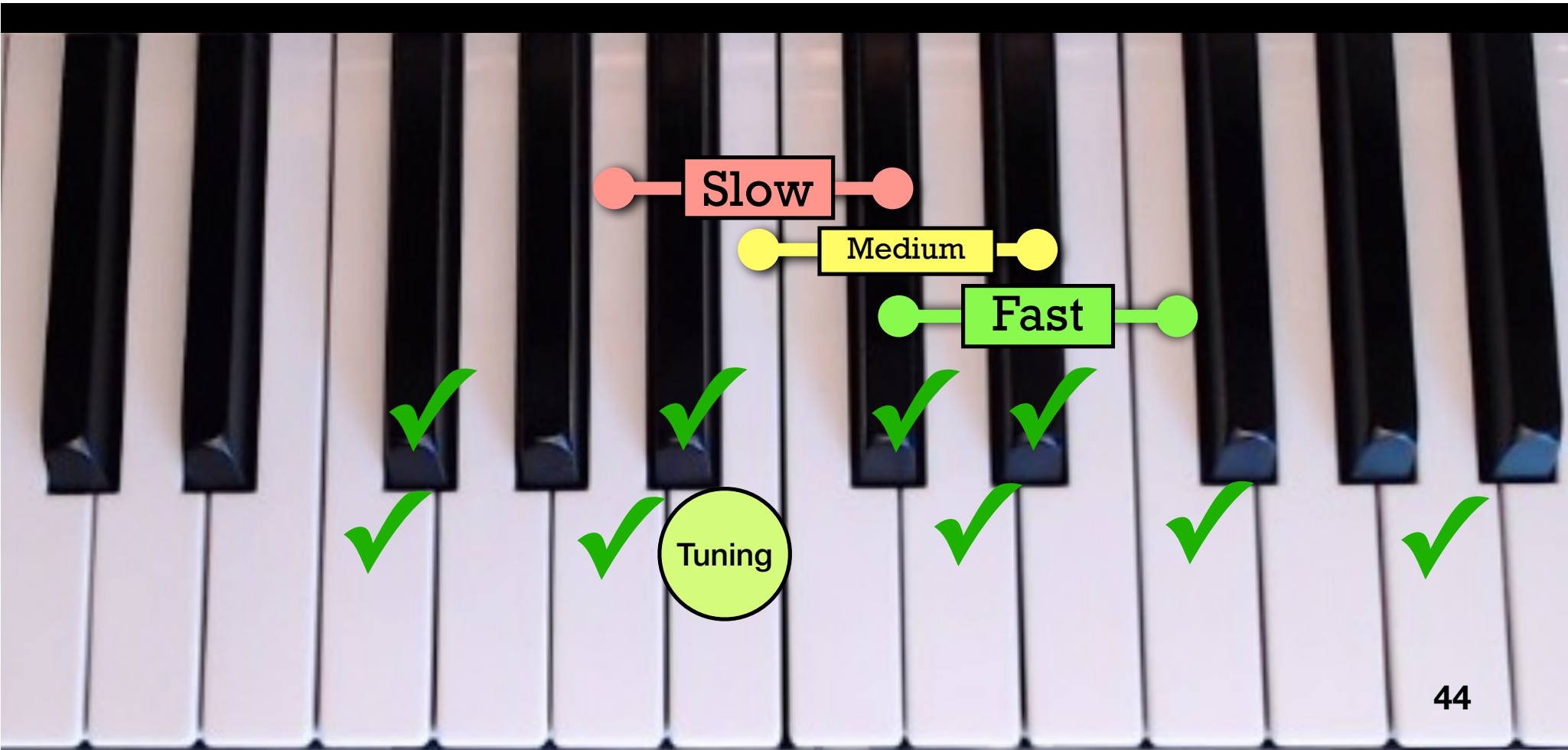
# B3

## The Common Finish

Tune **B3** so that;  
 $A3C\#4 < B3D\#4 < C\#4F4$

Make **B3D#4** beat  
*exactly halfway between*  
 $A3C\#4$  and  $C\#4F4$

 Note Being Tuned  
 Already Tuned





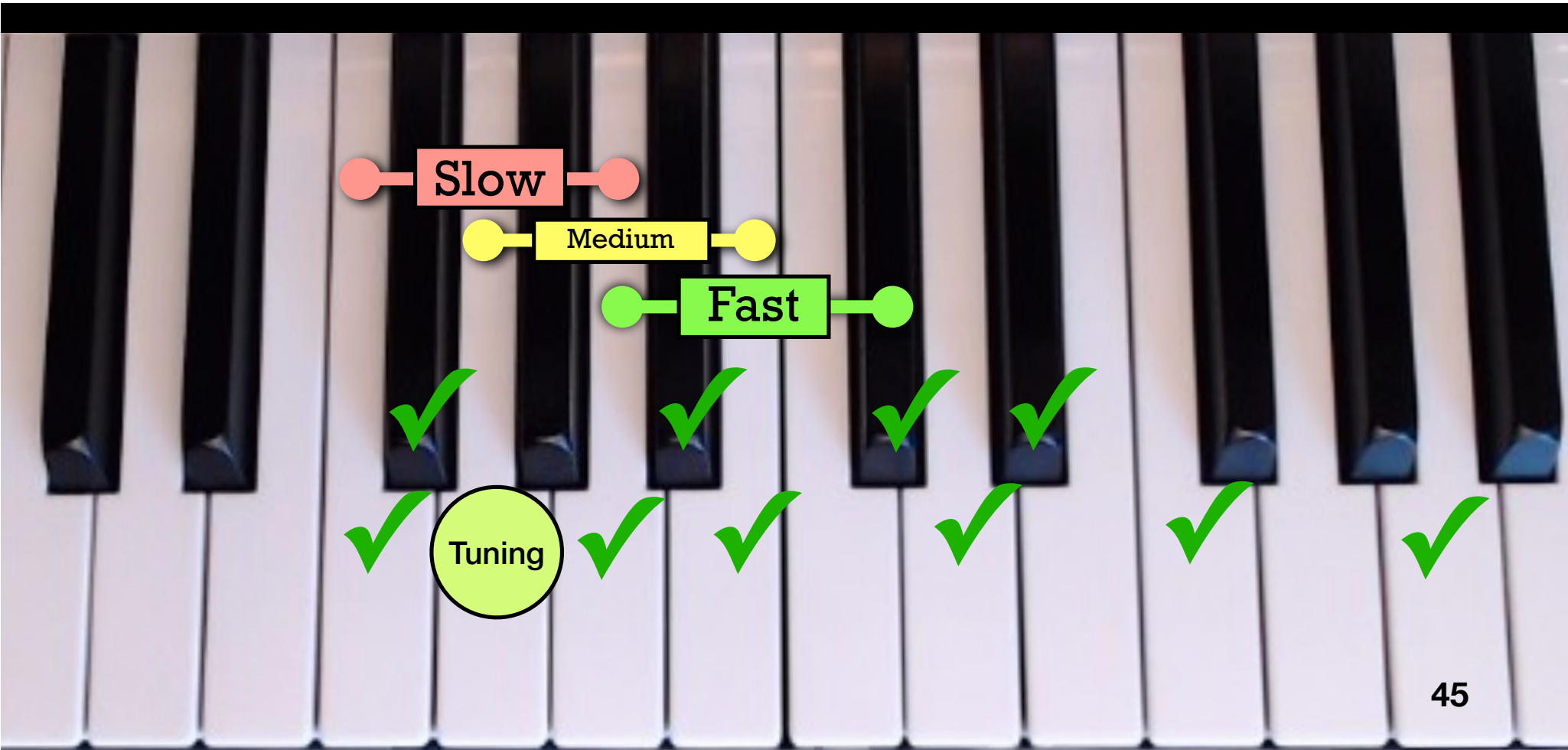
# G3

## The Common Finish

Tune **G3** so that;  
**F3A3 < G3B3 < A3C#4**

Make **G3B3** beat  
*exactly halfway between*  
**F3A3 and A3C#4**

 Note Being Tuned  
 Already Tuned





# E4

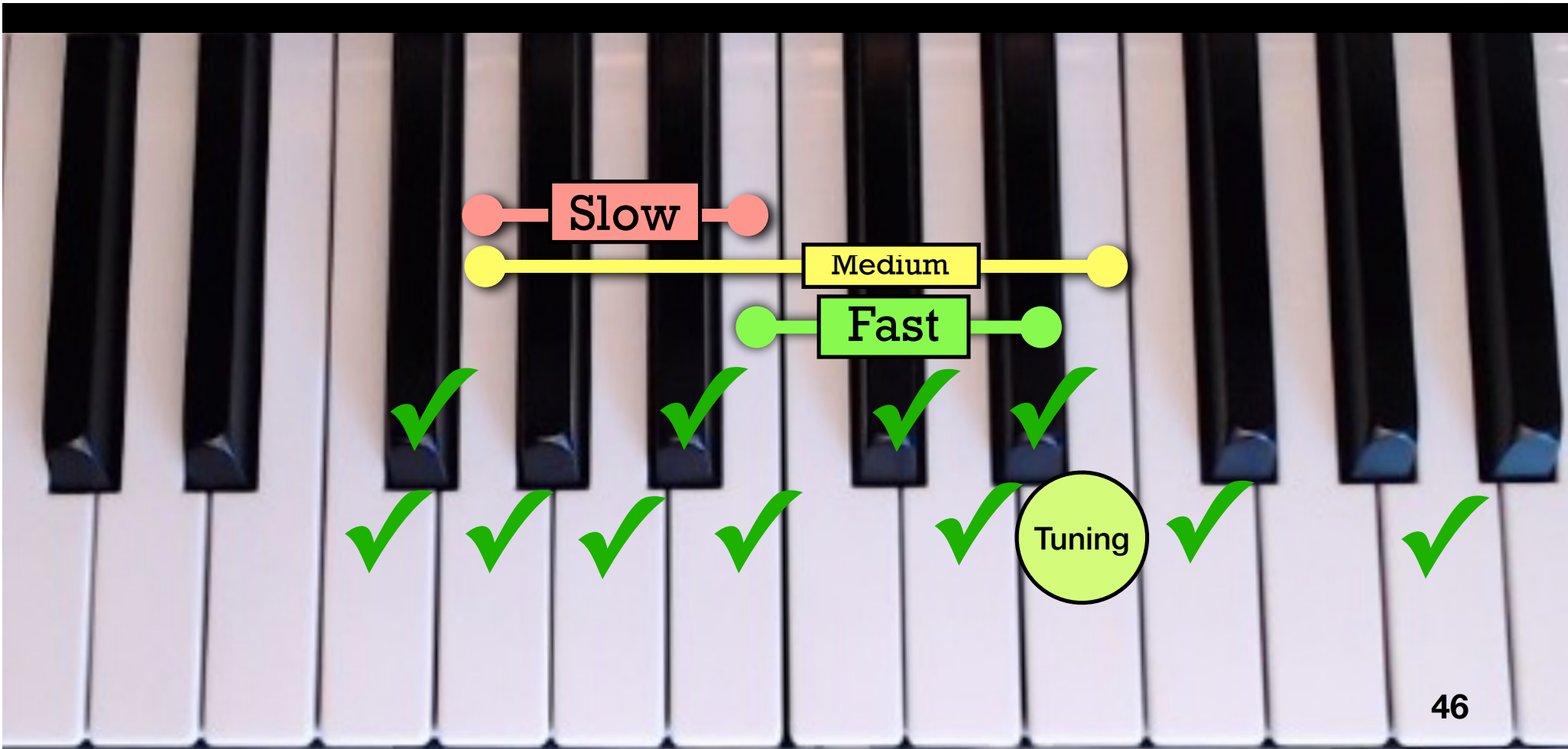
**MODIFICATION:** Because the M3/M6 equality isn't perfect, we can end up with some accumulated error. Here it is ok and even preferred if we tune G3E4 closer to B3D#4

## The Common Finish

Tune E4 so that;  
 $G3B3 < G3E4 < B3D\#4$

Make G3E4 beat  
*exactly halfway between*  
G3B3 and B3D#4

 Note Being Tuned  
 Already Tuned





# C4

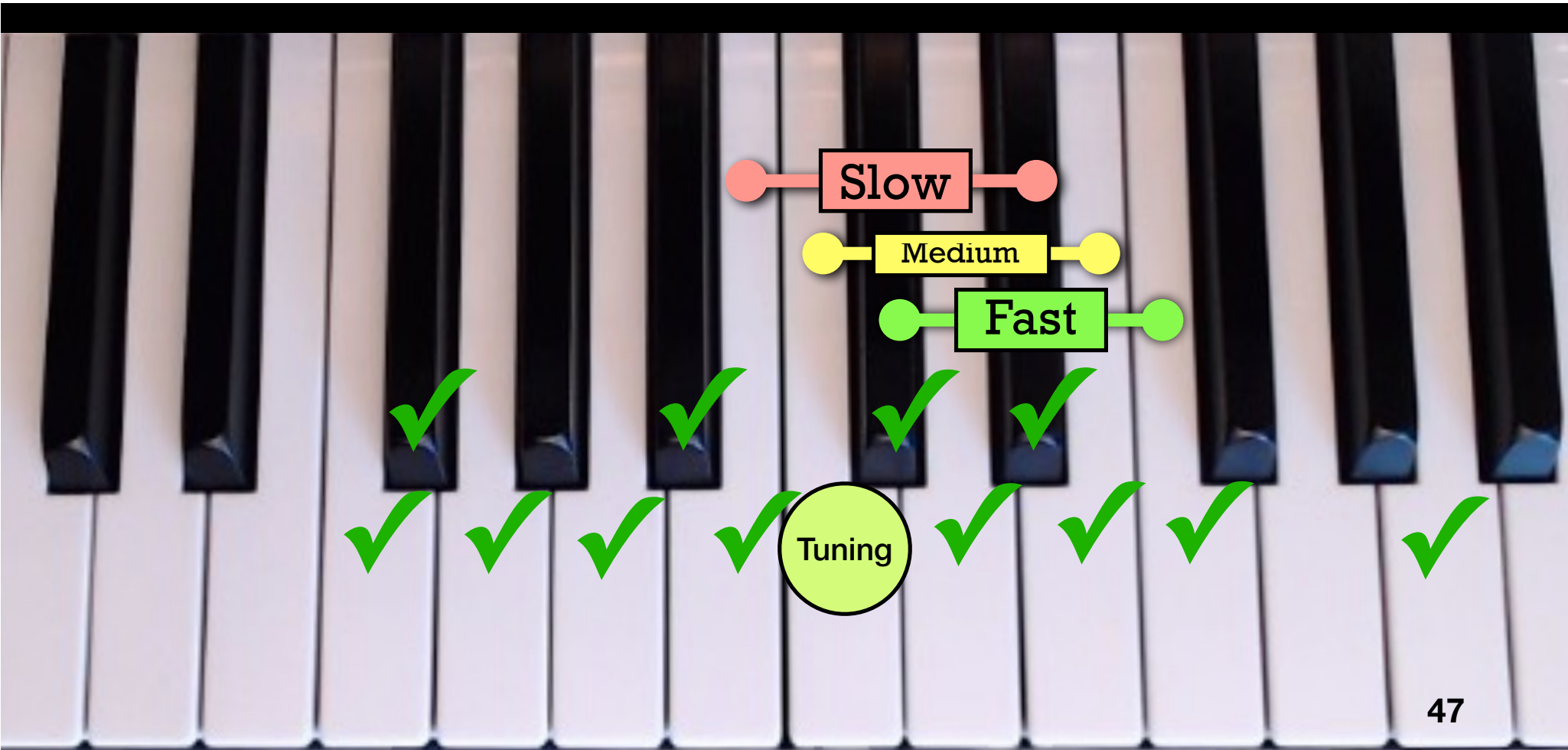
## The Common Finish

\*Already tuned in Medium Sequence

Tune **C4\*** so that;  
**B3D#4 < C4E4 < C#4F4**

Make **C4E4** beat  
*exactly halfway between*  
**B3D#4 and C#4F4**

 Note Being Tuned  
 Already Tuned



# G#3

## The Common Finish

\*Already tuned in Medium Sequence

Tune **G#3**\* so that;  
**G3B3 < G#3C4 < A3C#4**

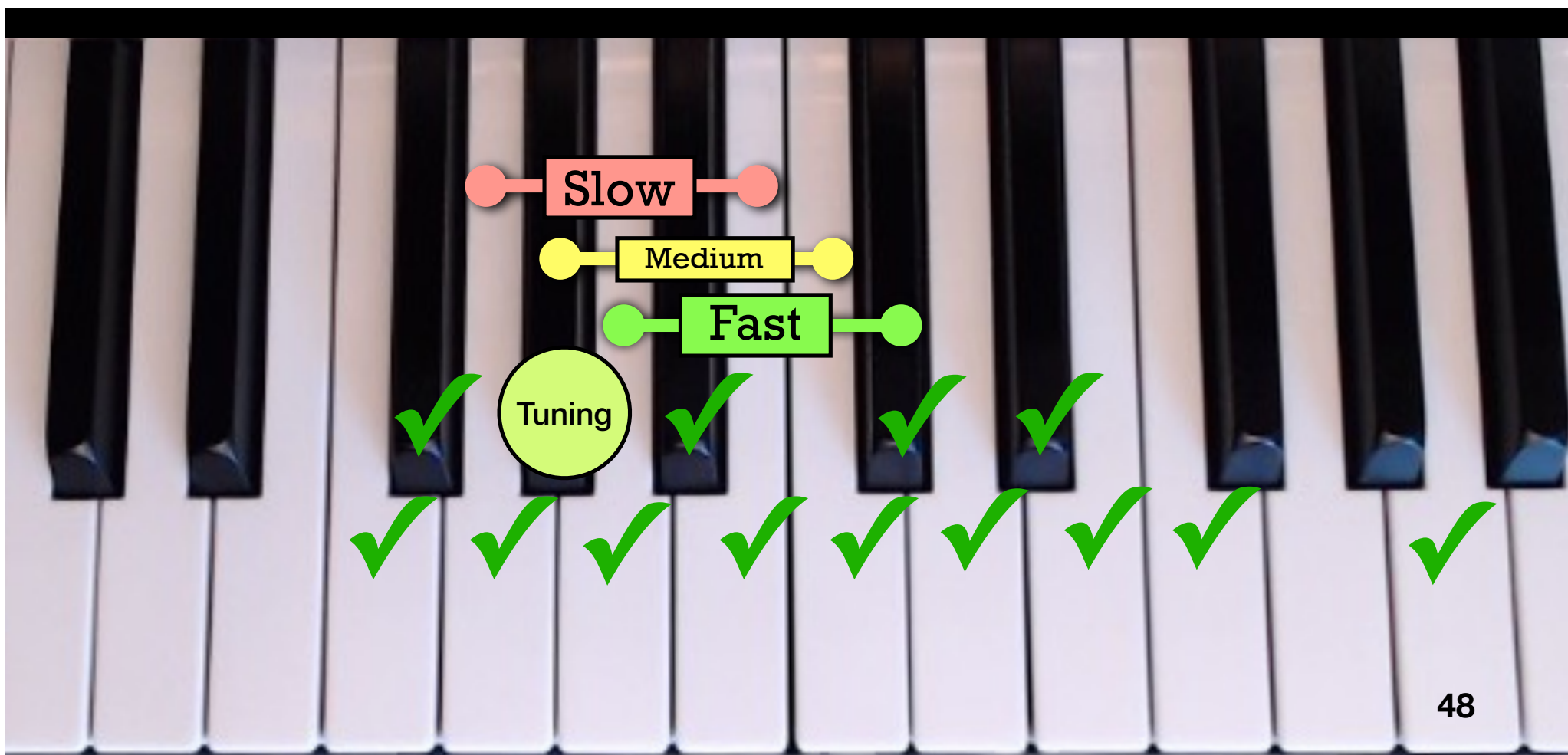
Make **G#3C4** beat  
*exactly halfway between*  
**G3B3** and **A3C#4**



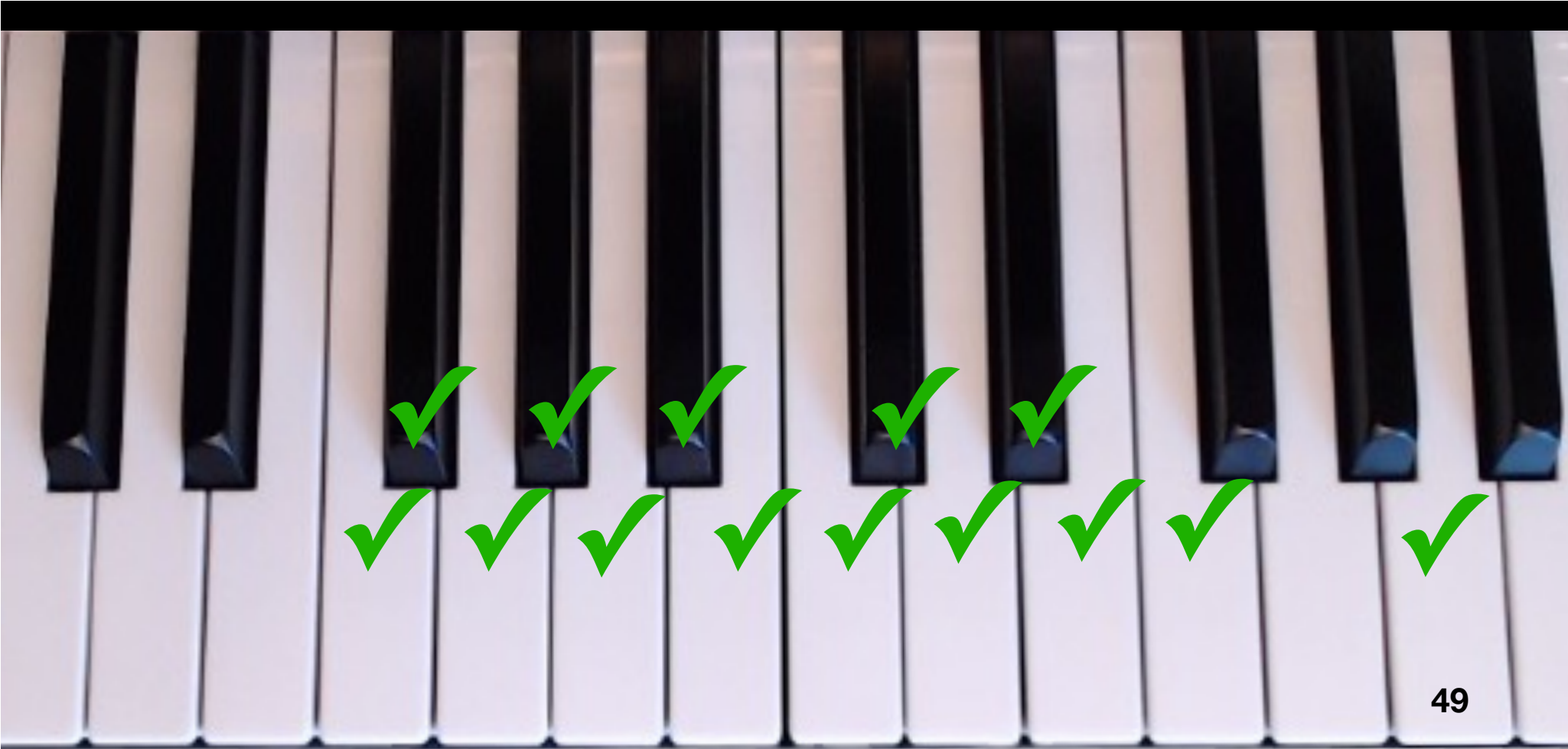
Note Being Tuned



Already Tuned

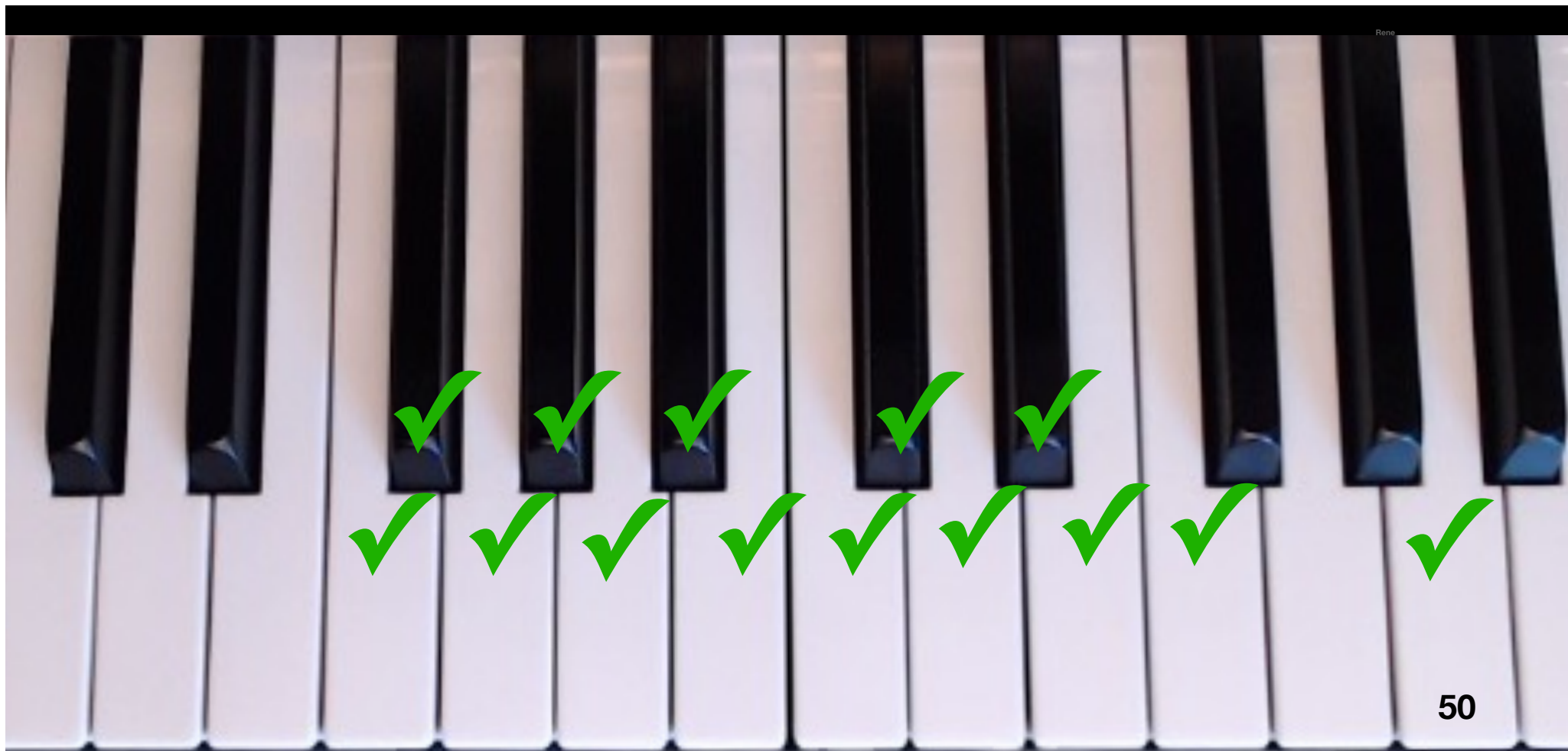


F3 to F4 Tuned



### Refinement Procedure

- Check M3's, P4's, P5's, etc. Look for intervals that don't "fit".
- When a bad interval is found, check each interval note of the bad interval, *the way it was tuned in this sequence*, starting with the first note tuned.



## The Go A.P.E. Refinement Procedure

Approximately 50% of the time, no refinement is needed, however the refinement process, if needed, is very efficient.

The Go A.P.E. procedure to refine notes involves checking interval speeds.

Using M3's and P4/P5, as well as beat speed windows, we are constantly looking for intervals that don't fit. Chromatic M3's that have a M3 that slows down. A P4 that is beating faster than its neighbours. A beat speed window that has collapsed. These are all examples of interval relationships that were not tuned correctly or were destroyed by drifting due to instability or other unknown reasons.

Whatever the reason, once an interval has been found to not fit, we check each interval note, *the way it was tuned*.

Traditional refinement methods involve checking every possible interval around the note in question, looking for a majority of interval tests that confirm one note needs to be corrected. And to do that, you have to use all the notes first. This takes time.

The Go A.P.E. method only requires you to check one interval relationship—the one that set the note in the first place. We only need this one relationship because the method is so accurate.

Examples:

Interval error: G3D4 P5 is too narrow.

1st note to check: D4

D4 window: F3A3 < F3D4 < A3C#4

Result: Speeds are progressive.

2nd note to check: G3

G3 window: F3A3 < G3B3 < A3C#4

Result: G3B3 same speed as F3A3.

Correction: Lower G3 until F3A3 < G3B3 < A3C#4

This will correct the too narrow G3D4.

## Secondary Errors

One type of secondary error is found when you are searching for an error but can't find a problem. Then you imagine what secondary error would hide the primary error.

Example:

Primary interval error: G#3C#4 P4 is too wide.

1st note to check: C#4

C#4 window: Skeleton F3A3 < A3C#4 < C#4F4 < F4A4

Result: Speeds are progressive.

2nd note to check: G#3

G#3 window: G3B3 < G#3C4 < A3C#4

Result: Speeds are progressive.

Conclusion: C4 must be a secondary error.

3rd note to check: C4

C4 window: B3D#4 < C4E4 < C#4F4

Result: Speeds are progressive.

Conclusion: E4 must be a secondary error from C4

4th note to check: E4

E4 window: G3B3 < G3E4 < B3D#4

Result: G3B3 = G3E4

Conclusion: E4 is low

Correction:

- Raise E4 so that G3B3 < G3E4 < B3D#4
- Raise C4 so that B3D#4 < C4E4 < C#4F4
- Raise G#3 so that G3B3 < G#3C4 < A3C#4

Now G#3C#4 will be less wide.

## Window Errors

Window errors are found when windows that have already been tuned, disappear.

Example:

Interval error:  $C4E4$  slows down. i.e.  $B3D\#4 > C4E4 < C\#4F4$  ←

1st note to check: E4

E4 window:  $G3B3 < G3E4 < B3D\#4$

Result:  $G3B3 = B3D\#4$ . i.e. the window has disappeared!

Conclusion:  $D\#4$  may have drifted down.

2nd note to check: D#4

D#4 window:  $F\#3A\#3 < F\#3D\#4 < A\#3D4$

Result:  $F\#3A\#3 = F\#3D\#4$

Conclusion: D#4 drifted down

Correction: Raise D#4 so that  $F\#3A\#3 < F\#3D\#4 < A\#3D4$

Then check E4 again, now that the G3B3-B3D#4 window has been restored.

Checking E4 again

D#4 window:  $G3B3 < G3E4 < B3D\#4$

Result: Speeds are progressive

3rd note to check: C4

C4 window:  $B3D\#4 < C4E4 < C\#4F4$

Result:  $B3D\#4 > C4E4 < C\#4F4$  ←

Conclusion: This is an interesting example where the interval error is the window.

Correction: Lower the C4 until  $B3D\#4 < C4E4 < C\#4F4$

There are similarly accurate, precise, and efficient techniques to tune the bass and treble. For more information, you may go to [howtotunepianos.com](http://howtotunepianos.com)

*Mark Cerisano, RPT, B.Sc.(Mech.Eng.), Dip.Ed.(Music)*

## Modification to the Sequence

The Go A.P.E. Bisecting Beat Speed Windows procedure and its accuracy are based on the following elements:

- 1) We use M6 and m3 that will eventually beat the same as a M3. When used like this, the M6 and m3 are called “Surrogate Major Thirds”, and are found using the following two equalities.
- 2) The inside/outside M3/M6 equality.
- 3) The m3/M3 equality which is found by aurally measuring the inharmonicity of the midrange by measuring F3F4 and A3A4.
- 4) We tune notes so that they produce an interval that beats exactly halfway between to other already tuned intervals, called the “window”, which beat as a *slow* speed and a *fast* speed, relative to each other.
- 5) Confirming that the window exists before using it to tune a third “medium” interval, helps us to find notes that drifted or were not tuned correctly to begin with.

### One Problem With Our Assumption in #2:

Mathematically, the outside M6 does not beat the same as the inside M3. In fact, the M6 beats 1.87% faster than the M3.

So, when we tune D4 so that F3D4 beats exactly halfway between F3A3 and A3C#4, we are tuning D4 slightly flat.

This is not a big problem because we cannot hear the difference; it is less than 3%, our limit of hearing beat speed differences.

## Modification to the Sequence (cont.)

However, as we continue to use the M3/M6 equality, which is also used to develop the m3/M3 equality, notes get progressively flatter.

### One Place Where the Problem Can Be Heard

After using numerous surrogate M3's, we can end up at E4 where we tune it as a M6 between the M3's, G3B3 and B3D#4.

At this point, E4 may be so flat that when we check our temperament using P4's and P5's we may find some problems.

These problems are creating because the E4 is flat and we then go on to tune C4 and G#3 from E4.

When tuning the C4 from the E4 as a progressive M3 and then G#3 from C4 as a progressive M3, the M3's sound fine, but because **E4, C4, and G#3** are all flat, we can have these problems, and indeed, presence of these problems confirms a flat E4.

- a) P5, A3**E4** is too noisy
- b) P4, B3**E4** is pure
- c) P4, **C4**F4 is too noisy
- d) P4, G3**C4** is pure
- e) P5, F3**C4** is too noisy
- f) P4, **G#3**C#4 is too noisy
- g) P5, **G#3**D#4 is pure

## Modification to the Sequence (cont.)

What can make this hard to fix is that when the C4 and G#3 are found to be part of an interval that doesn't fit, they are checked using the procedure that tuned them in the first place, but the procedure set them as M3's, from a flt E4.

In others words, they pass the test.

As mentioned in the section on refining, when both notes pass the test, then we have to use a regression and go back one step.

A correct G#3 sends us back to C4, and a correct C4 sends us back to E4.

But it's at E4 where we usually find that our ear will "allow" E4 to be raised. But in fact, when we listen to the speed of G3E4 within the window G3B3 and B3D#4, we should understand that we can "allow" our ear to accept E4 even when our ear can tell that G3E4 is beating *closer* to B3D#4, because *that* is the correct speed of the M6; closer to the top M3!

### How To Prevent This Problem and Need Less Refinement.

What I have found is that when I tune D#4 and E4, and I set them only very slightly closer to the top M3rd, that's when I find less problems and less refinement is needed.

This modification fixes the error produced when the M3/M6 equality produces cumulative error that is audible in the P4 and P5.

## One Note on Fixing Errors

As has already been stated, when we find an interval that is not progressive, the procedure is to check and see if the note still *fits* in the window that originally tuned it.

For example, let's say that B3E4 is too noisy and stands out from its neighbours.

The first thing we think is,

“Let's check B3 the way it was tuned, and then let's check E4 the way *it* was tuned”

(since B3 was tuned before E4).

But to add to the efficiency, we could use what I call the *Permission* approach.

### The Permission Approach

The first thing we do is understand that our tuning is pretty accurate, so if a P4 is out, it's probably too wide. (If it was out the other way, it would sound pure before it sounded narrow.)

That means the B3 could be low, or the E4 could be high.

The Permission Approach comes from the idea that we are not trying to be perfect.

For example, checking B3 and trying to confirm that B3D#4 beats exactly halfway between A3C#4 and C#4F4, is called the Perfection Approach. This is not efficient. Nobody's perfect.

## One Note on Fixing Errors (cont)

The Permission Approach allows us to accept the possibility that our ears are not perfect, in order to give ourselves permission to improve the tuning.

What do I mean by that and how do we use this idea?

Well, the B3 could be low, right?

So, instead of checking the B3 and trying to confirm that B3D#4 beats exactly halfway between A3C#4 and C#4F4, we listen to B3D#4 and ask ourselves:

“Do I have permission to *raise* the B3?”

If B3 is low, you might not hear that B3D#4 is beating closer to C#4F4, but your ear might say, “Hey, if you raised the B3, I think it would still sound halfway between A3C#4 and C#4F4.”

But, if the B3 was ok, or even slightly high, your ear might say,

“Um, no. I am not happy with that idea. I don’t think I would like it if B3D#4 were slower than it is right now.”

The Permission Approach allows us to accept that our ear is not perfect, but at the same time, gives our ear the power to let us be imperfect, as far as the ear is concerned.

This approach removes the need for us to be perfect and replaces it with the idea that if we can fix a problem by changing something that is so close to perfect that changing it will not change how it sounds, then we will have more options to improve the tuning.







