



## Solving the White Cross - Songs & Chants for Learning

Elementary



**Purpose:** The aim of this lesson is to make the inversion move of the white cross accessible to all elementary students through the use of a chant and kinesthetic hand movements.

**Background:** Students should spend one lesson prior to this lesson learning about the three types of cube pieces: center, edge, and corner. They should have experience moving the top & bottom of the cube, right & left faces, and front & back faces of the cube.

**Opening:** *Today we are going to learn to solve the first step of the Rubik's Cube: The White Cross. Everyone take their cubes in their right hand. Now find the white 'button', or center piece. For today's lesson, the white center piece will be the top of our cube, so you will always keep this piece facing up.*

*To solve the white cross, you are going to put the four white edge pieces to the top: first the blue/white piece, then the orange/white piece, then the green/white piece, and then the red/white piece. We complete it in this order so we don't undo what we complete. Remember, edge pieces have two colors on them, not three.*

**Lesson:** *Before we begin to solve the white cross on our own cubes, we are going to learn the inversion move: a move you will do if you find that one of your edge pieces is upside down when it gets to the top. Everyone stand up and we are going to chant together:*

### **The Inversion Move Chant**

***This is a repeat after me song*** (students repeat)

***That means you say what I say and you do what I do*** (repeat)

***You put your right toward your ear*** (repeat)

***And the top to the left*** (repeat)

***And the front to the left*** (repeat)

***And the top to the right*** (repeat)

\*see the [video](#) for coordinating hand movements for this chant.

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Have students practice the chant a few times, then have a few different volunteers lead the other students in the chant. It should come to them automatically when they encounter an inverted piece on the cube.

**Practice:** Now that students have practiced the inversion chant, have them put their finger on the white 'button' on the top of the cube. Have students hold the blue face in their right hands. Whichever face they are working on should be in their right hand for the inversion move to work. Students who have an inverted piece on the blue face should come to the front and demonstrate the inversion move with the chant to the rest of the group. Go through each step with the group. Students who complete the move more quickly and independently can help other students or practice again. Have students mix each other's cubes before starting the white cross move again. Give them a goal of completing the white cross in 20 seconds or less.

**Troubleshooting:** If students find they have to move a white piece that is already in place out of the way, have them put it back in its proper place before moving on.

**Independent:** Have students practice making the white cross 5x each day for one week before they move onto the next lesson.

### **YouTube links:**

Entire playlist: <http://tinyurl.com/ElemVideos>

Videos for this lesson:

[https://youtu.be/a-b\\_pWFQQjw](https://youtu.be/a-b_pWFQQjw) and <https://youtu.be/ZR02zS0PoVM>



## Solving the White Corners - Songs & Chants for Learning

Elementary



**Purpose:** The aim of this lesson is to make the algorithms necessary to solve the white corners of the Rubik's cube accessible to all elementary students through the use of a chant and kinesthetic hand movements.

**Background:** Students who are unable to solve the white cross in 25-30 seconds should continue practicing before moving onto the white corners.

**Opening:** *Today we are going to finish solving the white top layer of the cube by solving the white corners. For today's lesson, the white center piece will still be the top of our cube, so you will always keep this piece facing up. To solve the white corners, you first need to have the white cross solved. Once you've solved the white cross, fold your hands and look at me. (Give students time to solve the white cross. Check for students who will need extra practice.)*

**Lesson:** Have students stand to chant with you. *Today's chant is quite simple. There are four moves that will be repeated one or more times to solve the white corners.*

### The White Corners Chant

*This is a repeat after me chant (students repeat)*

*That means you say what I say and you do what I do. (repeat)*

***Right down (repeat)***

***Bottom Left (repeat)***

***Right Up (repeat)***

***Bottom Right (repeat)***

\*see the [video](#) for coordinating hand movements for this chant.

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Have students practice the chant a few times, then have a few different volunteers lead the other students in the chant. For added support, students can write the words to the four moves on a white board before they practice.

**Practice:** Before students practice, they need to know that the corner piece needs to be positioned directly above or below its 'street corner' for this move to work. For example, if a student is looking at the white/blue/red corner piece, it needs to be positioned between the red and blue center pieces (on its 'street corner'). Students need to hold the corner they are working on in their right hand with the corner being worked on nearest to their right thumb. Before they begin, demonstrate the correct way to perform the four moves. Demonstrate the incorrect way to complete this move: some students leave a white corner on top even when it doesn't match its 'street corner'. This will not solve the top layer of the cube. *Remember, keep performing the move with the white 'button' on top and the corner you are working on in your right hand until the corner is on top in the correct position.*

**Troubleshooting:** Make sure students have the corners in the proper positions, so that the corners match the center pieces.

**Independent:** Have students practice solving the top white corners of the cube 5x daily for one week before moving onto the next layer. Stronger students can be paired with struggling students from time-to-time. Students who wish to participate in a challenge can participate in beat the teacher challenges, beat the clock challenges, and white cross or white layer competitions against one another.

### **YouTube links:**

Entire playlist: <http://tinyurl.com/ElemVideos>

Videos for this lesson:

[https://youtu.be/Yvwl\\_lkmOH4](https://youtu.be/Yvwl_lkmOH4) and <https://youtu.be/rzsrlYjzKh4>



## Solving the Middle Layer- (left) Songs & Chants for Learning

Elementary



**Purpose:** The purpose of this lesson is to incorporate as many learning modalities as possible to help elementary students solve the middle layer of the Rubik's Cube.

**Lesson:** Have students prepare cubes by solving the top layer. Tell students, *Now that you know the Superman move, you can almost always solve the middle layer of the cube, but what happens when an edge piece needs to be moved to the left side rather than the right side of the cube? For this mirror image move, we are going to need some help from one of the best martial artists in the world: Jackie Chan.*

Show a picture of Jackie Chan with nunchucks. Explain that we will always picture Jackie Chan in our minds using his nunchucks with his left hand: left hand up, then left hand down while the nunchucks are being swung. Have students stand in a place where they have an arm's length of space on either side. Teach the song:

### The Jackie Chan Move

*This is a repeat after me song (students repeat)*

*That means you say what I say and you do what I do (students repeat)*

***Hey, hey, bo-diddly-bop***

***I'm gonna get this to the LEFT spot***

***With an upside down T in my LEFT hand***

***I'm gonna flip like Jackie Chan!***

***Top Right***

***LEFT Up***

***Top Left***

***LEFT Down***

***Top Left***

***Face Right***

***Top Right***

***Face Left***

See [video](#)  
for hand  
motions.

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*This move is a mirror image move to the Superman move. Whenever you need to move a piece from the top to the left side of your cube, picture Jackie Chan with his left arm going up and then down with those nunchucks.*

Before students practice, write the patterns on the board. *All cubes down! Before we practice this move, we need to look for meaningful patterns within the move. Just like with the Superman move, the more patterns we can find, the more easily our minds will be able to remember what to do when we get to this move.* Refer to the moves on the board (it helps to write them in a column). Students observe that every other move is an opposite move (top right/top left, left up/left down), every other move is a top move, and in moves 2 and 4 you do left up/ left down, but in moves 6 and 8 you do face right/face left. Students also observe that the first move always moves away from that arm up/arm down move.

Mark meaningful patterns in different colors for students to refer to later. Refer students to the copies of lyrics from earlier. Have students highlight patterns on the song to match the colors they used on the Superman song.

Give students an opportunity to practice solving the middle layer.

**Closure:** *Now you've learned both steps to solve the middle layer of the cube. When you need to move a piece from the top of the cube to the right, which move do you do? (Superman!) Which move will you do if you want to move a piece from the top to the left side of the cube? (Jackie Chan!)*

**YouTube links:**

Entire playlist: <http://tinyurl.com/ElemVideos>

Video for this lesson:

<https://youtu.be/KVgpqH8Tbak>



# Solving the Middle Layer- (right) Songs & Chants for Learning



**Purpose:** The purpose of this lesson is to incorporate as many learning modalities as possible to help elementary students solve the middle layer of the Rubik's Cube.

**Lesson:** Have students prepare cubes by solving the top layer. Tell students, *Today we are going to learn a more challenging algorithm, but we aren't going to do it alone. We are going to have a little help from the man of steel himself: Superman! When we have learned his signature move, you will have the skills it takes to solve (most of) the middle layer of the Rubik's Cube easily!*

Demonstrate a Superman stance and show them that if he flies, he will put his right arm up to go up into the air. When he's done, he simply places his arm at his right side. That is the main idea behind this move. Right arm up, right arm down. Have students stand in a place where they have an arm's length of space on either side.

## The Superman Move

*This is a repeat after me song (students repeat)*

*That means you say what I say and you do what I do (students repeat)*

***Hey, hey, bo-diddly-bop***

***I'm gonna get this to the right spot***

***With an upside down T in my hand***

***I'm gonna flip like Superman!***

***Top Left***

***Right Up***

***Top Right***

***Right Down***

***Top Right***

***Face Left***

***Top Left***

***Face Right***

See [video](#) for hand motions.

*Before we get started practicing this move with our cubes, we need to understand what we are doing and why this move works. When we look at the cube I have in my hand, I have flipped it over and have the yellow 'button' on top. What I'm trying to do is to get each edge piece that is in the incorrect spot to the correct spot on the sides. The first thing I'll need to do is make an upside down T. (demonstrate and allow students to create an upside down T with their cubes) Now, if my piece on the top of my upside down T belongs on the right side of my cube, I'm going to do the Superman move! How do I know it belongs on the right? Because the edge piece will have the color of the face I'm looking at, as well as the color of my next door neighbor to the right of me. Now help me demonstrate the move that's going to get this piece to its correct location by singing the Superman song with me. (Sing song together slowly as you demonstrate the move). Allow students to practice the move. Students who struggle may need you to hold the base of the cube while they practice for the first time.*

*All cubes down! Before we practice this move one more time, we need to look for meaningful patterns in the move. After all, the more patterns we can find, the more easily our minds will be able to remember what to do when we get to this move. Refer to the moves on the board (it helps to write them in a column):*

Students observe that every other move is an opposite move (top left/top right; right up/right down)., every other move is a top move, and in moves 2 and 4 you do right up/right down, but in moves 6 and 8 you do face left/face right. Mark meaningful patterns in different colors for students to refer to later. Pass out song lyrics. Have students highlight patterns on the song, ie. Top Right= Green, Top Left= Blue, Superman move (right up/right down)= red with a Superman S next to it.

**Note:** Students will need the second half of this lesson really soon after this portion of the lesson so they can completely solve the middle layer. (Solving the Middle Layer- left)

### **YouTube links:**

Entire playlist: <http://tinyurl.com/ElemVideos>

Videos for this lesson:

<https://youtu.be/n8RMocZxyoE> and <https://youtu.be/orab5VBtaTM>

## Solving the Middle Layer Song Lyrics

### Superman Move

(move a piece to the right)

Hey, hey, bo-diddly-bop  
I'm gonna get this to the right spot  
With an upside down T in my hand  
I'm gonna flip like Superman!

Top Left  
Right Up  
Top Right  
Right Down  
Top Right  
Face Left  
Top Left  
Face Right

### Jackie Chan Move

(Move a piece to the left)

Hey, hey, bo-diddly-bop  
I'm gonna get this to the LEFT spot  
With an upside down T in my LEFT hand  
I'm gonna flip like Jackie Chan!

Top Right  
Left Up  
Top Left  
Left Down  
Top Left  
Face Right  
Top Right  
Face left



## Solving the Yellow Cross Songs & Chants for Learning

Elementary



**Purpose:** The aim of this lesson is to make stage 5: Solving the Yellow Cross accessible to all elementary students through the use of a song.

**Background:** Students should have spent time solving the top and middle layers of the cube and should be comfortable solving the those two layers in 3 minutes or less.

**Opening:** *Now we are going to solve the yellow cross. This algorithm can seem tricky at first, so we are going to learn a song to go with it. Is everyone familiar with this tune? (Hum the tune to The Mexican Hat Dance). We call this the 'Fururf' move and we will be putting the moves to this stage to that fun tune!*

**Lesson:** *Before we begin to solve the yellow cross, let's take a look at the patterns for these two algorithms. Display a poster with both sets of moves side-by-side (see pg. 4).*

**Ask:** *Which patterns are the same in both moves? (A: The first and last moves!)*

*What else do you notice about the first and last moves? (A: They are both front face moves; the first is a right and the second is a left!)*

*What about other patterns within the first algorithm? (A: The second and third moves are mirror image moves of the fourth and fifth moves; the second and fourth moves are top moves, whereas the third and fifth moves are right moves).*

*What other patterns can you find in the second algorithm? (A: The second and third moves are also mirror image moves of the fourth and fifth moves; the second and fourth moves are right moves, whereas the third and fifth moves are top moves.)*

*Other than the first and last moves, how else are the first and second algorithms the same? How are they different? (A: The first algorithm pattern goes: Top Left, Right Up, Top Right, Right Down; whereas the second algorithm goes Right Up, Top Left, Right Down, Top Right.)*

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Great work finding patterns! Now let's put the first algorithm to music:

**F.U.R.U.R.F. Move (To the Mexican Hat Dance Tune)**

**Front Right**

**Top Left**

**Right Up (clap, clap)**

**Top Right**

**Right Down**

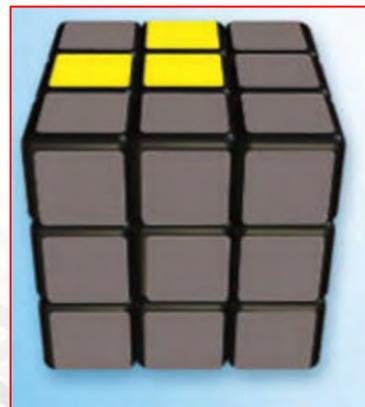
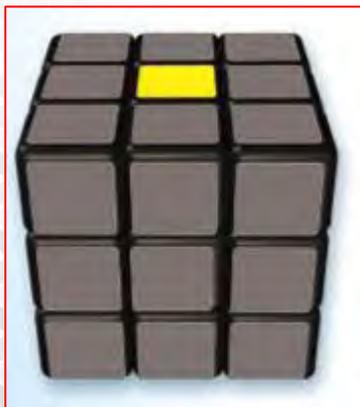
**Front Left (clap, clap)**

\*repeat if needed

Two more notable patterns within this sequence are 1.) There are only two lefts within the algorithm. They happen at the 2nd and 6th moves. 2.) There are three 'moves' and then three 'undo', or opposite moves.

Note: The acronym F.U.R.U.R.F. stands for front, up, right, up, right, front. Thinking about the acronym seems to give the students (and teachers!) an extra layer of understanding in their memory banks.

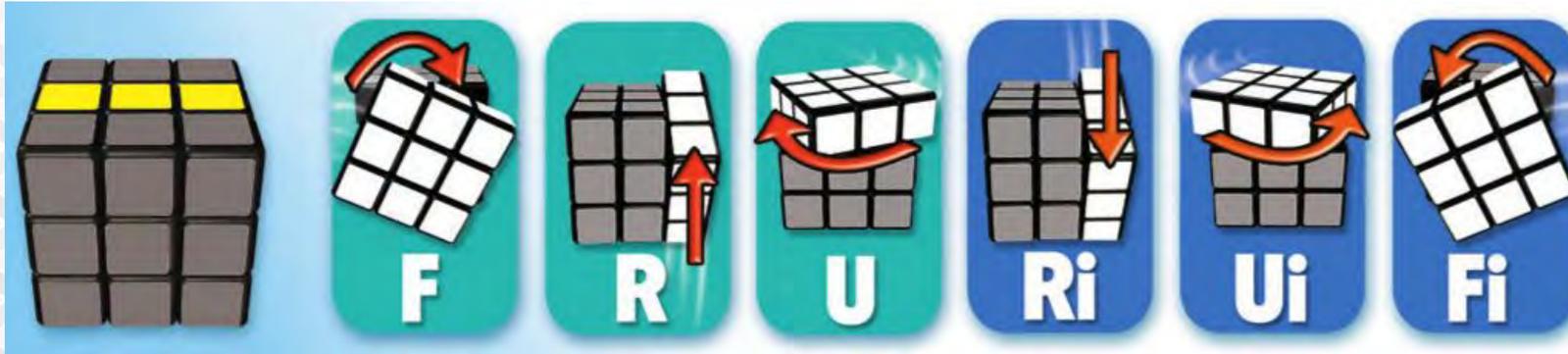
*Now we need to know when to use the first algorithm. When you finish solving the middle layer, turn the cube so that the yellow center square is on top. If you have either just the yellow center on top, or a small yellow 'L' in the top left corner, you will complete the F.U.R.U.R.F. algorithm to solve the cube (see the above song). You may have to complete the sequence more than once to get the yellow cross.*



If, however, you have a yellow 'belt' across the cube, you will complete the second algorithm, or sequence of moves, to solve for the yellow cross. Instead of F.U.R.U.R.F., your move will be F.R.U.R.U.F.! The song will be the same, but the lyrics will change slightly:

**F.R.U.R.U.F. (when you have a yellow 'belt')**

**Front Right**  
**Right Up**  
**Top Left (clap, clap)**  
**Right Down**  
**Top Right**  
**Front Left (clap, clap)**  
\*repeat



**Practice:** Give students the opportunity to practice the move until they've solved the yellow cross. Have extra cubes on-hand that are solved through the middle layer to provide ample practice time for students.

**Independent Practice:** Have students practice the moves through the yellow cross five times daily for one week. Provide lyrics for students to take home to practice, and make sure students have access to the training video. Once students have mastered the steps through the yellow cross in 3 minutes, they will be ready to go onto the next stage.

**YouTube links:**

Entire playlist: <http://tinyurl.com/ElemVideos>

Video for this lesson:

<https://youtu.be/M8afNuq-0rY>

FUR-URF

vs

FRU-RUF

Front Right

Up (Top) Left

Right Up

Up (Top) Right

Right Down

Front Left

Front Right

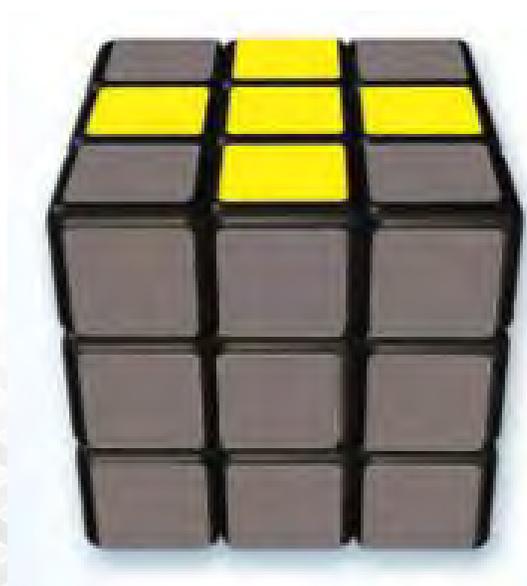
Right Up

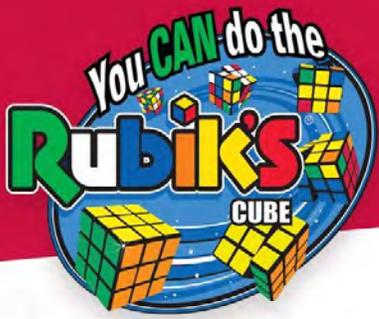
Up (Top) Left

Right Down

Up (Top) Right

Front Left





## Solving the Last Layer- All yellow on top Songs & Chants for Learning

Elementary



**Purpose:** The aim of this lesson is to make solving stage 5, part 2 (yellow corners) of the Rubik's Cube accessible to all elementary students through the use of a chant and kinesthetic hand movements.

**Background:** Students should be able to solve the cube through the beginning of stage 5 (the yellow cross) in three minutes or less before moving onto this stage.

**Opening:** *You've learned so many steps to solve the Rubik's Cube. Would you believe you know 45 steps so far? Which stage has been the most challenging to learn so far? Which stage has been easiest? While I'm so proud of each of you for your perseverance during the challenging stages and steps of the Cube, I think you all deserve a break today! How does that sound?*

**Lesson:** *We call this 'The Easy Peasy Move', because students find this to be the easiest step in the solve. We have a fun song for this move, and I think you'll soon understand why students breathe a sigh of relief and just enjoy the ease with which they are able to complete 'The Easy Peasy Move'*

### The Easy Peasy Move (Yellow Corners on Top)

Right Up  
Top Left  
Right Down  
Top Left  
Right Up  
Top Left  
Top Left  
Right Down

See the  
[video](#) for the  
coordinating  
tune.

[www.YouCanDoTheCube.com](http://www.YouCanDoTheCube.com)

Look for patterns within the move: Every other move is a right, except the two top lefts toward the end. The top face of the cube is only moved to the left during this move. The right pattern is up, down, up, down.

*Now that you've become familiar with the patterns, can you see why students find this move to be so simple? Before we solve this move, we need to know one more trick: how to hold our cube when completing this move. There will be three ways to hold the cube, depending upon the pattern on the top. If no corners are on the top face of the cube, you'll put your yellow pointer finger on a yellow tile on the left side (See the book for illustration). If one corner cube is on top, you'll see that it looks like a yellow fish. In that case, have the yellow 'fish' eat out of your left palm before starting the move. If any two corners of the cube are yellow, place your left thumb on a yellow piece of the cube (see the book for illustration).*

*Now that you've matched your top face to one of the above states, perform the 'easy' move. After each sequence, orient the cube to rematch the top face to the appropriate state and repeat the sequence until all four top corners are yellow.*



**Extension:** After experiencing the success of this move, students will feel encouraged. Have them channel that positive energy into a letter to their future selves.

Example: Dear Future Me, I'm writing to encourage you to persevere during the final steps of the cube. You are so close to solving this! Don't quit now. You can do this. Think of how many steps you've already learned. Don't be discouraged. You will soon experience the ultimate success. Just don't give up! Love, Your Past (and Super Successful) Self

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### YouTube links:

Entire playlist: <http://tinyurl.com/ElemVideos>

Video for this lesson:

<https://youtu.be/tMB9THEzCog>



## Solving the Last Layer- Position Yellow Corners Correctly Songs & Chants for Learning

Elementary



**Purpose:** The goal of this lesson is to make the algorithms necessary to solve yellow corners of the Rubik's Cube accessible to all elementary students through a song.

**Background:** Before students are ready to solve this layer of the cube, they should be able to solve the the white cross & corners, the middle layer, the yellow cross, and the yellow top of the cube. Do not attempt to teach this lesson before students have mastered the prior layers and sequences.

**Procedure:** Have students prepare cubes by solving through the yellow top layer of the cube. Show students the steps of the stage 6 sequence. Have them find meaningful patterns. Notable patterns: right, front, right, back, back // right, front, right, back, back; the left face of the cube is never moved during this sequence; and the top face of the cube is never moved until the very last move of this sequence.

### *The Persevere Song (You're Almost There!)*

*Right Down  
Front Right  
Right Down  
Back, Back  
Right Up  
Front Left  
Right Down  
Back, Back  
Right Up, Right Up  
Top Right*

See [video](#) for the tune of the song.

[www.YouCanDoTheCube.com](http://www.YouCanDoTheCube.com)

Practice the song a few times before showing the students how to position the yellow corners correctly (place the two correct corners in the back A, B or diagonally A, D or B, C across from each other (see below or Solution Guide for image).



**Practice:** Have students position cubes correctly and practice the sequence. Assign practice goal of 5x daily until students are able to complete the steps to this point in three minutes or less.

**YouTube links:**

Entire playlist: <http://tinyurl.com/ElemVideos>

Video for this lesson:

<https://youtu.be/tMB9THEzCog>



## Solving the Final Edges Songs & Chants for Learning

Elementary



**Purpose:** The goal of this lesson is to make the algorithms necessary to solve the final edge pieces of the Rubik's Cube accessible to all elementary students through a chant.

**Background:** Before students are ready to solve this layer of the cube, they should be able to solve the the white cross & corners, the middle layer, the yellow cross, the yellow top and yellow corners of the cube. Do not attempt to teach this lesson before students have mastered the prior layers and sequences.

**Procedure:** Have students prepare cubes by solving through the yellow top and yellow corner layers of the cube. Show students the steps of the stage 6 sequence. Have them find meaningful patterns. Notable patterns: Front, front happens on the first, middle, and final lines of this 'poem'; top to the left is the 2nd and the 2nd from the bottom; left down, right down is toward the middle on either side of the middle stanza 'front, front'.

### ***The Final Moves Chant***

*(pat, clap, pat, clap)*

***Front, Front***

***Top to the Left (or right)***

***Left Down, Right Down***

***Front, Front***

***Left Up, Right Up***

***Top to the Left (or right)***

***Front, Front***

See [video](#) for the rhythm of the chant.

[www.YouCanDoTheCube.com](http://www.YouCanDoTheCube.com)

Note that students will do top to the left (or right) move based on the direction those final edge pieces are going. Also, if the edge pieces are not all moving in the same direction around the cube, they may have to complete the sequence more than one time.



**Practice:** Have students position cubes correctly and practice the sequence. Assign practice goal of 5x daily until students are able to complete the steps to this point in three minutes or less.

**YouTube links:**

Entire playlist: <http://tinyurl.com/ElemVideos>

Video for this lesson:

<https://youtu.be/QMJ16uGkSHI>

## **The White Cross Inversion Chant**

Directions: When you come to a piece that is 'upside down' when you are solving the white cross, do the following sequence with that piece in your right hand:

**You put your right toward your ear  
and the top to the left  
and the front to the left  
and the top to the right.**

## **The White Corners Chant**

Directions: When you have a white corner piece either in the top right or bottom right position on its proper 'street corner', do the following sequence until it is in the proper position and location:

**Right down, bottom left, right up, bottom right**

Note that this sequence also works to get a corner piece that is in the incorrect corner off of the top of the cube without disturbing your white cross.

## **The Superman Move**

Directions: When you are solving the middle layer of the cube, put the yellow face up. Create an 'upside down letter T' with one of the colors. If the top edge piece is moving to the right side of the cube, do the following sequence:

**Hey, hey, bo-diddly bop!  
I'm gonna get this to the right spot!  
With an upside down T in my hand,  
I'm gonna flip like Superman:**

**Top Left  
Right Up  
Top Right  
Right Down  
Top Right  
Front Left  
Top Left  
Front Right**

## **The Jackie Chan Move**

Directions: When you are solving the middle layer and an edge piece needs to move from the top edge to the LEFT side of the cube, do the following sequence:

**Hey, hey, bo-diddly bop!  
I'm gonna get this to the left spot!  
With these nunchucks in my left hand,  
I'm gonna flip like Jackie Chan:**

**Top Right**

**Left Up**

**Top Left**

**Left Down**

**Top Left**

**Face Right**

**Top Right**

**Face Left**

## **F.U.R.U.R.F. Move**

F.U.R.U.R.F. stands for Front, Up (Top), Right, Up (Top), Right, Front  
Directions: When you are solving the yellow cross and you do not have a yellow 'belt' across the cube, position the yellow pattern according to the solution guide and do the following sequence (to the tune of the Mexican Hat Dance):

**Front Right**

**Top Left**

**Right Up**

**Top Right**

**Right Down**

**Front Left**

This sequence may need to be done more than once. If a yellow 'belt' emerges after the above sequence is complete, reverse the 2nd and 3rd, as well as the 4th and 5th moves of the sequence and complete it as the

F.R.U.R.U.F. sequence

(Front, Right, Up (Top), Right, Up, Front)

**Front Right**

**Right Up**

**Top Left**

**Right Down**

**Top Right**

**Front Left**

### **The Easy Peasy Move**

Directions: Once you've completed the yellow cross, look at the positioning of the cube in the solution guide and complete the following sequence:

**Right Up**

**Top Left**

**Right Down**

**Top Left**

**Right Up**

**Top Left**

**Top Left**

**Right Down**

Repeat this sequence until the yellow top is completed.

### **The Perseverance Move (Almost There!)**

Directions: See the solution guide for positioning the cube. Do the following sequence to put the yellow corners in their proper locations:

**Right Down  
Front Right  
Right Down  
Back, Back**

**Right Up  
Front Left  
Right Down  
Back, Back  
Right Up, Right Up  
Top Right**

### **The Final Move**

Directions: If all of the edge pieces need to rotate to the left on the cube, do the sequence front to the left. If they need to rotate to the right, do the sequence front to the right. If the edge pieces need to rotate in both directions, do the front to the left sequence and try again.

**Front, Front  
Top to the Left (or right)  
Left Down, Right Down  
Front, Front  
Left Up, Right Up  
Top to the Left (or right)  
Front, Front**