

Sample Hands-On-Training™ Chapter – Review Copy Only

Copyright ©2000-2003 by lynda.com, Inc. All Rights Reserved.
Reproduction and Distribution Strictly Prohibited.

This electronically distributed Hands-On-Training™ document is for review purposes only and is intended for on-screen viewing only. Any printing, reproduction, copying, distribution, and/or transmission of this document are strictly prohibited without written consent from lynda.com, Inc.

Contact Information

Garo Green (garo@lynda.com)

Director, Publications

lynda.com, Inc.

PO Box 789

Ojai, California 93024

Phone: 805-646-7076

Fax: 805-640-9607

Notice of Rights

All rights reserved. No part of this book may be reproduced or transmitted in any form by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the lynda.com, Inc. For information on getting permission for reprints and excerpts, contact garo@lynda.com.

Notice of Liability

The information in this book is distributed on an “As Is” basis, without warranty. While every precaution has been taken in the preparation of the book, neither the author nor Peachpit Press shall have any liability to any person or entity with respect to any loss or damage caused or alleged to be caused directly or indirectly by the instructions contained in this book or by the computer software and hardware products described in it.

Trademarks

Hands-On-Training is a registered trademark of lynda.com, Inc. Macromedia is a registered trademark. Macromedia Dreamweaver and Dreamweaver, and Macromedia Fireworks and Fireworks are registered trademarks of Macromedia, Inc., in the U.S. and/or other countries. QuickTime and the QuickTime logo are trademarks used under license. The QuickTime logo is registered in the U.S. and other countries.

4.

Animation Basics

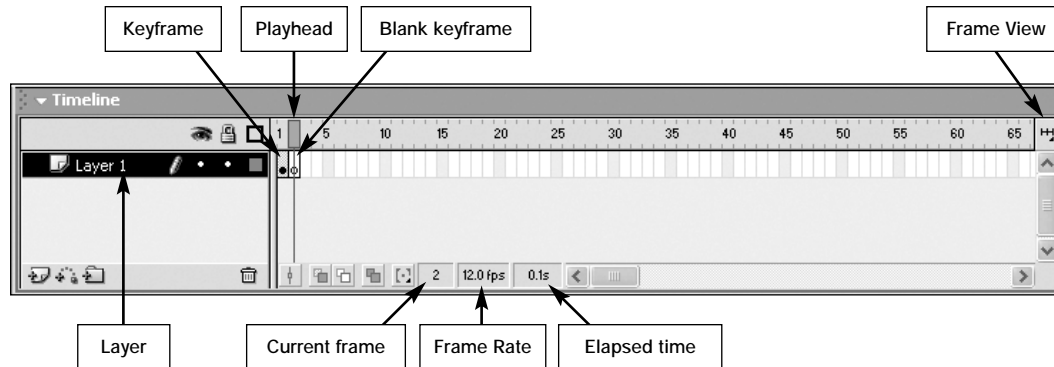
Timeline	Projects and Movies	Document Properties
Frame Types	Frame-by-Frame Animation	Onion Skinning
Free Transform Tool	Frame Rate	Inserting and Deleting Frames
Copying and Reversing Frames	Testing Movies	

chap_04

Macromedia Flash MX
H•O•T CD-ROM

Macromedia Flash MX has a reputation as a powerful and robust animation tool. If you know other animation tools, such as Macromedia Director or Adobe After Effects, you might find yourself looking for similarities. It might surprise you that it's actually easier to learn the animation capabilities of Macromedia Flash MX if you don't know other animation programs, because you have no preconceived notions of how you think it might work. If you've never used an animation tool before, you have an advantage over more experienced animators for this reason! This chapter introduces you to the Timeline, which plays a significant role in producing animation. This is the part of the interface where you will work with keyframes, blank keyframes, frame-by-frame animation, and Onion Skinning. If these are new terms to you, they won't be for long! This chapter also covers setting the frame rate and how the frame rate affects playback speeds. By the end of this chapter, things should really get moving for you, all puns intended!

The Timeline



Understanding and working with the **Timeline** is essential to creating animation in Macromedia Flash MX. The illustration above identifies the elements of the Timeline that you will be working with in this chapter. In Chapter 5, *"Shape Tweening,"* you will learn all about the options in the Layers section of the Timeline. The following chart gives a detailed description of the features identified above.





Timeline Features	
Feature	Description
Layers	Layers are a way of organizing the elements of your animation from front to back on the Stage, so that one object can move in front of or behind another or can make transitions that are independent of other objects. The Layer controls for your movie appear on the left side of the Timeline. Each layer has options for hiding or showing the layer, locking it, and displaying its contents as outlines. You will learn more about layers in Chapter 5, <i>"Shape Tweening."</i>
Current frame	Displays the current position of the Playhead and the frame number of the frame that is currently visible.
Frame Rate	Displays the number of frames per second (or fps) at which the movie attempts to play on your end user's browser or computer. Double-clicking here is a quick way to access the Document Properties dialog box.
Elapsed time	Displays time elapsed from Frame 1 to the current Playhead location at the currently selected frame rate.

continues on next page

Timeline Features <i>continued</i>	
Feature	Description
Frame View	This pop-up menu gives you several different options for specifying how the Timeline is displayed. Use it if you want to see fewer or more frames on the Timeline. The default view is usually just fine until you start creating a longer animation. At that point, it's great to be able to see more frames as you work.
Blank keyframe	Blank keyframes are empty locations on the Timeline that are ready to have content placed into them. They can also be used to break up or make changes in your animation.
Keyframe	Keyframes define the moment in the Timeline when actions or animation changes occur. Keyframe content display remains unchanged until another keyframe or a blank keyframe occurs in the Timeline.
Playhead	The Playhead—a red rectangle with a long red line—indicates the current frame that you are viewing in the Timeline. You can click and drag (scrub) the Playhead back and forth in the Timeline to quickly preview your animation.

Projects and Movies

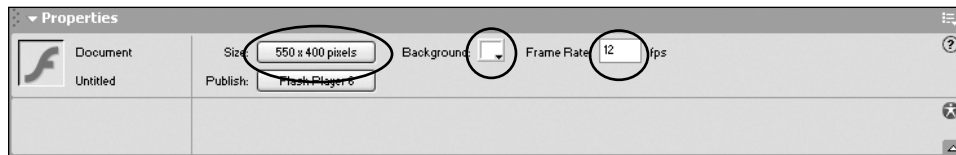
In Macromedia Flash MX, the term “movie” can be used to refer to three separate files—the authoring project file (with the extension .fla), the Macromedia Flash MX content file that is published for the Internet (with the extension .swf), and the content published as a stand-alone file (projector). All of these different types of movies can become rather confusing when you are learning Macromedia Flash MX. To help avoid this confusion, I will be using the terms **project** to identify the .fla file, **movie** to identify the .swf file, and **projector** to identify the projector files. A more comprehensive explanation of these different file types is available in Chapter 1, “*Background Information*.” Here’s a handy chart that illustrates the differences between these different types of files:

File Types		
Icon	File Type	Description
 Untitled.fla	Project	This file always has an extension of .fla and is the master authoring file used to create Macromedia Flash content.
 Untitled.swf	Movie	This file always has an extension of .swf and is the only file you will upload to be viewed on the Internet. It is a compiled version of the project file.
 Untitled.exe  Untitled Projector	Windows Projector Macintosh Projector	Macromedia Flash MX can produce stand-alone projector files for the Windows and Macintosh operating systems. Windows projector files have an extension of .exe. Macintosh projector files have the word “Projector” appended to the end of the file name.

I. Document Properties

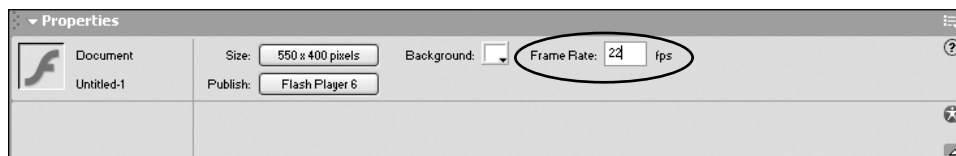
The **Document Properties** are general specifications that affect your entire project. The first thing you should do when you start a new project in Macromedia Flash MX is to set these properties, which include things such as Stage dimensions, frame rate, and background color. This exercise will show you how to set them.

1. Copy the **chap_04** folder, located on the **H•O•T CD-ROM**, to your hard drive. You need to have this folder on your hard drive in order to save files inside it.
2. Create a new file and save it as **movie.fla** in the **chap_04** folder.

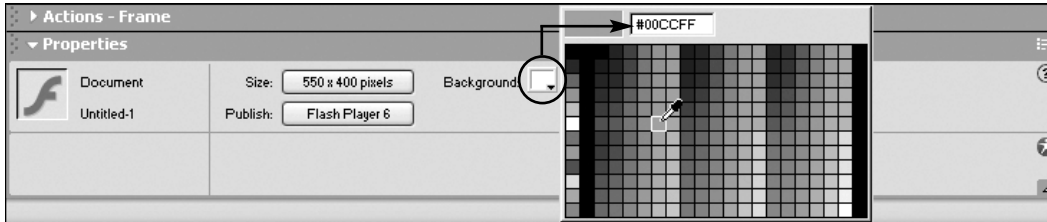


3. The **Property Inspector** should be visible near the bottom of the document window. If it is not visible, choose **Window > Properties** to open it.

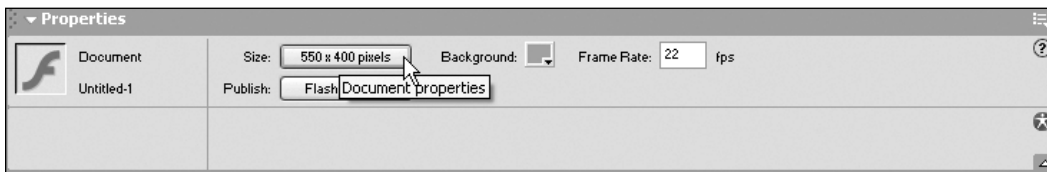
By default, the Stage dimensions will be 550 × 400 pixels, the movie will have a white background, and the frame rate will be 12 frames per second. You'll learn how to change each of these settings in the steps that follow.



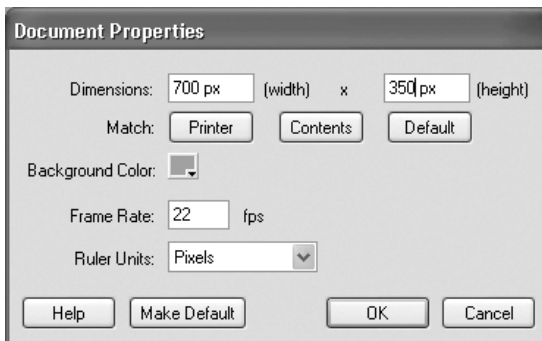
4. In the **Property Inspector**, set the **Frame Rate** to **22**. This sets the frame rate of your movie to 22 frames per second (fps). In other words, for every 22 frames in your animation, 1 second of time will elapse. You will learn more about the frame rate later in this chapter.



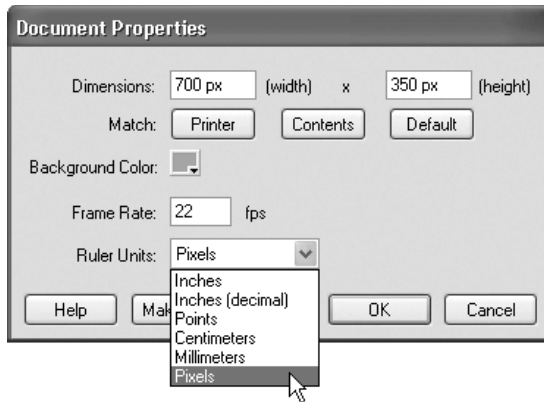
5. In the **Property Inspector**, click the **Background Color** box. This will display the default color palette. Select a **light blue** color. This will change the background color of your movie to light blue.



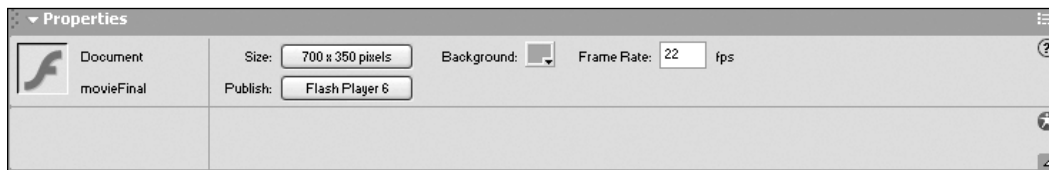
6. With the Property Inspector still open, click on the **Size** button. This will open the **Document Properties** dialog box, which contains all the frame rate preferences, movie dimensions, background color, and rule measurements that you can set for your entire movie.



7. In the **Document Properties** dialog box, for the **Dimensions** settings, enter a **width** of 700 and a **height** of 350. These options control the absolute pixel dimensions of your Stage. You will learn other ways to control the size of your movie when you get to Chapter 16, "*Publishing*"



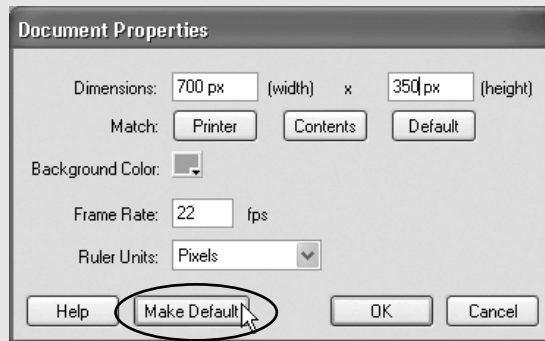
8. Click the **Ruler Units** arrow to see the drop-down menu. This menu contains several different methods for displaying the ruler units on your Stage. Make sure you leave this option set to the default of **Pixels**.



9. Click **OK**. Notice that the values in the **Property Inspector**—the dimensions, background color, and frame rate—are changed to your new specifications.

You can quickly use the Property Inspector at any point to change the movie's background color or frame rate. In addition, you can use the Size button in the Property Inspector to access the Document Properties dialog box, where you can change the options not available in the Property Inspector. However, you should avoid changing the dimensions of your movie once you have added content to your Stage. The reason for this is that changing the dimensions once you've started creating artwork and animation causes the position of all your hard work to be offset, which can be difficult to fix.

10. When you are finished, save the changes you made to this file. However, don't close it just yet; you will need it for the next exercise.

TIP | Saving New Default Settings

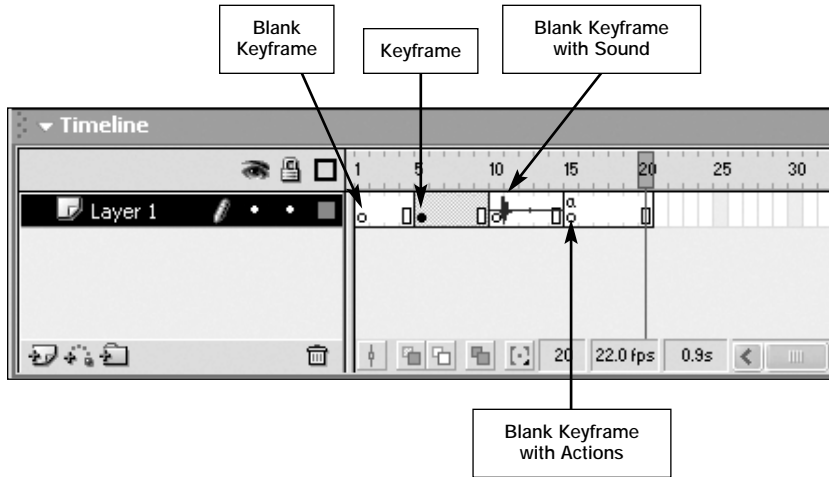
When you create a new movie, by default you will get a Stage that is 550 × 400 pixels with a white background. This size might not be all that convenient when you are working on projects that should have different settings. But there's good news—you can redefine the default settings so they better fit your needs. Simply change the Document Properties to match the settings you need and click the **Make Default** button. Next time you create a new movie, it will already have all the properties you want. Pretty cool!

What Is a Keyframe?

The term **keyframe** has been used in animation since the early 1900s. It signifies a change in motion, and in Macromedia Flash MX, keyframes are displayed on the Timeline. The Timeline represents the passing of time, with each slot representing an individual frame. If you have artwork in Frame 1 and you don't change it until Frame 20, the image in Frame 1 will persist until Frame 20. You would need to add a new keyframe in Frame 20 in order to make a change to the artwork. If you have artwork in Frame 1 and you want to change it in Frame 2, you would need to add a new keyframe in Frame 2; therefore, you would end up with two keyframes, one in Frame 1 and the other in Frame 2.

This concept might seem abstract to you if you've never worked with keyframes before, but you will have lots of opportunities to work with keyframes in this chapter, so they won't be alien to you for long.

Keyframes in Macromedia Flash MX



Keyframes are located in the Timeline. A keyframe that contains content displays a solid circle in the Timeline, and a blank keyframe that contains no content on the Stage is represented by a hollow circle in the Timeline. Subsequent frames that you add to the same layer will have the same content as the keyframe.

To complicate things a little more, Macromedia Flash MX has different kinds of frames and keyframes. The following chart describes the different types and gives the keyboard shortcut for each in parentheses.

Frame Types	
Term	Definition
Blank keyframe (F7)	A blank or empty keyframe is represented by a hollow circle. It means that there is no artwork on the Stage on that frame. The Timeline, by default, opens with a blank keyframe. As soon as you put content on the Stage, the blank keyframe changes to a keyframe. From that point on, this artwork will be copied to all frames until you define another keyframe or blank keyframe and change the content on the Stage at that frame. To confuse matters a little more, although a blank keyframe contains no artwork, it can contain sound and actions. You will learn more about sound in Chapter 13, " <i>Sound</i> "; and more about actions in Chapter 11, " <i>ActionScripting Basics</i> ."

continues on next page

Frame Types <i>continued</i>	
Term	Definition
Keyframe (F6)	A keyframe that contains content (meaning that artwork is on the Stage at that frame in the Timeline) is represented by a solid circle. By default, when you add a keyframe in Macromedia Flash MX, the content (except for actions and sounds) is copied from the previous keyframe. To make a change, you must alter the artwork on the Stage at the point on the Timeline where you have defined the new keyframe. Otherwise, Macromedia Flash MX will simply copy the content from the previous change. In other words, simply adding a keyframe will not cause the artwork to change.
Frame (F5)	The Timeline in Macromedia Flash MX looks as though it has lots of frames in each layer, which can be a bit deceiving! While it has slots for frames, you have to specifically define them as frames (or keyframes, etc.). You can do this by clicking in any of the slots and pressing F5 or by choosing Insert > Frame. It's possible to have a different number of frames on different layers. For example, Layer 1 could have 10 frames while Layer 2 has one frame. It is up to you to set the frames for each layer.
Clear Keyframe (Shift+F6)	To clear the content from a keyframe, you use the Clear Keyframe command. You do this when you want to erase the keyframe from the Timeline. Clearing a keyframe removes the content from the keyframe but leaves the frame. This will not reduce the number of frames on a layer but will simply remove the keyframe and change it to a regular frame. This command is usually used to fix (or clear) a mistake.
Remove Frames (Shift+F5)	If you ever want to delete frames that you have set, select those frames and press Shift+F5 or choose Insert > Remove Frames.

2.

Frame-by-Frame Animation with Keyframes

This exercise will teach you how to work with keyframes. A common animation technique is to make a word appear as though it is being written before your eyes. This is very simple to do using keyframes, because when you insert a keyframe, the program searches backward in the Timeline until it finds another keyframe and then copies that content to the newly inserted keyframe. You will learn how to make a word appear in the following steps.

1. Open the **movieFinal.fla** file from the **chap_04** folder. This file has been created for you so that you can see the finished version of the exercise.

WARNING | Windows Users

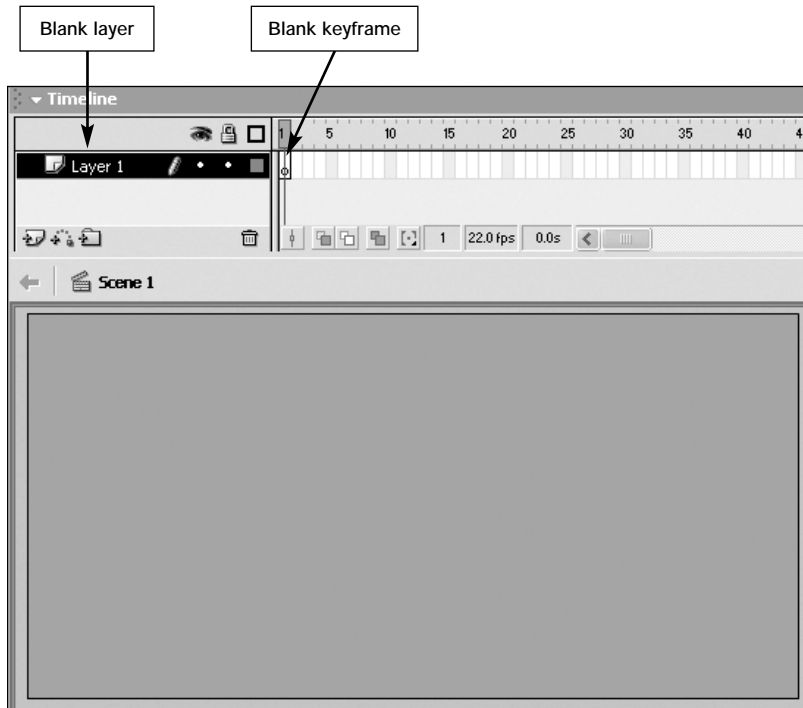
If you don't see a file named **movieFinal.fla** but you do see a file named **movieFinal**, your file extension display may be turned off on your computer. To learn how to make the file extension visible, see the *Introduction*.



2. Press **Enter/Return** on the keyboard to preview the animation on the Stage. You will notice the word "Xboarding" being written right on the screen as it animates. You will be creating this same frame-by-frame animation next.

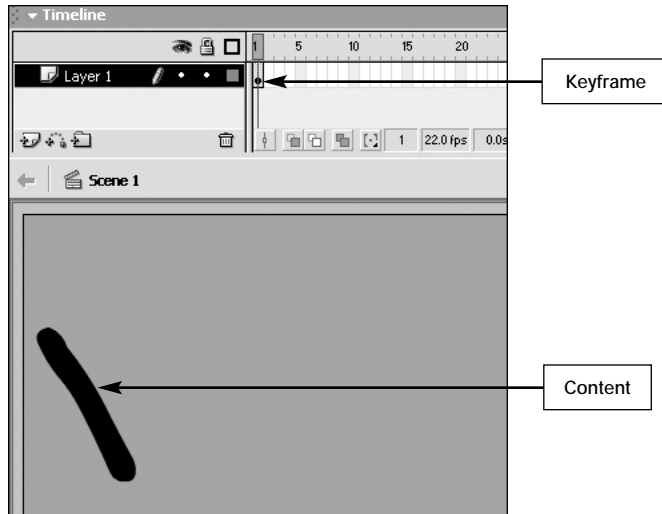
3. Close the **movieFinal.fla** file.

4. You should still have the **movie.fla** file open from the last exercise, but in case you accidentally closed it, go ahead and open the **movie.fla** file you saved inside the **chap_04** folder in the last exercise.



Notice that this document has a single layer containing a single blank keyframe. This is the way all new documents appear by default. Every project has to have a starting point, and this is the minimum you need to start drawing. The blank keyframe has a hollow circle and a line around the frame.

5. Select the **Brush** tool from the **Toolbox**. You can use any size, shape, and color (other than white—you will see why in step 11) you want. You are going to be writing the word “Xboarding,” one letter at a time, in a series of keyframes.

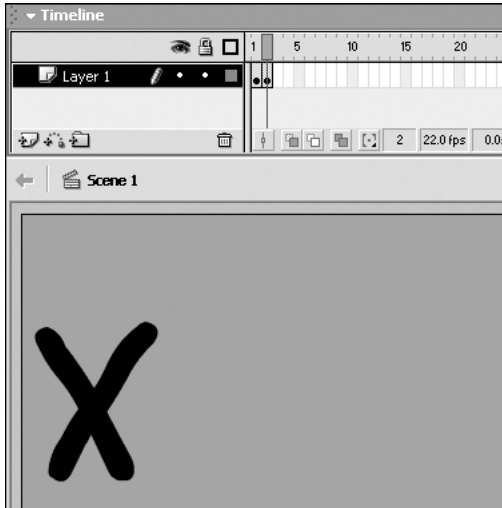


6. Using the **Brush** tool, draw the first part of the capital letter **X** on the left side of the Stage, as shown in the picture above. Notice that the blank keyframe in Frame 1 now contains a small black dot, which signifies that it contains content. Frame 1 is now referred to as a keyframe because it is no longer empty.

To make a change on the Timeline, you must have a keyframe where you want the change to occur. Now that you have filled in the first keyframe of Layer 1, you are going to add another keyframe after it so you can draw the second frame of your animation. Adding a new keyframe after the last one will copy all the content from the last keyframe to this new keyframe. You will draw another stroke in this new keyframe in order to create a change in your animation.

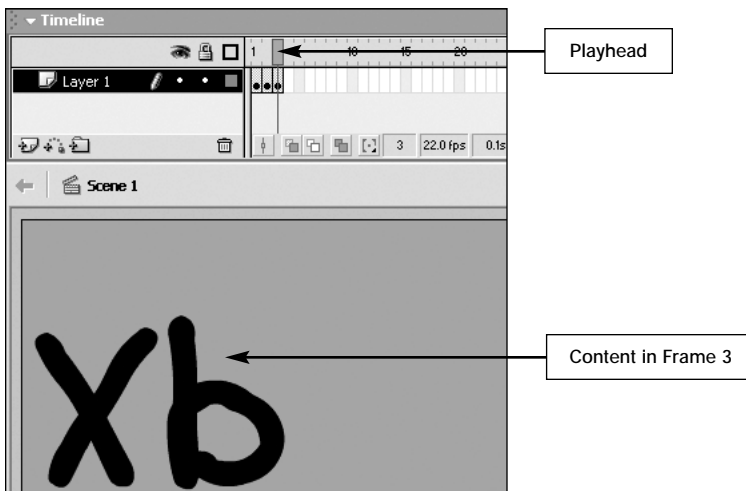
7. Select **Frame 2** and choose **Insert > Keyframe** or press **F6** (the shortcut key). This adds a new keyframe to the Timeline in Frame 2, copying all the artwork in Frame 1 and allowing you to continue drawing.

Tip: F6 is a keyboard shortcut you should learn right away, because you will be using it often to insert keyframes.



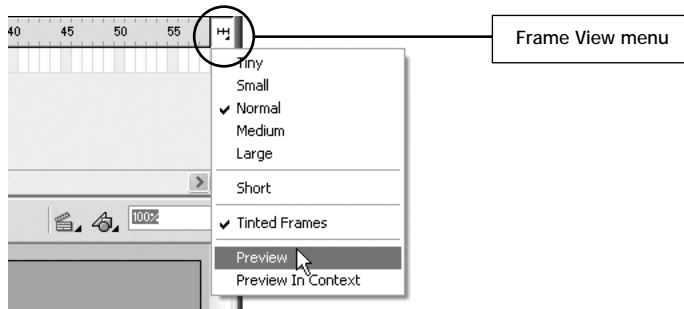
8. Using the **Brush** tool again, draw the second part of a capital **X** in the new keyframe, just like the picture above.

9. Press **F6**. This adds a new keyframe to the Timeline in Frame 3, copying all the artwork from the previous keyframe, Frame 2.

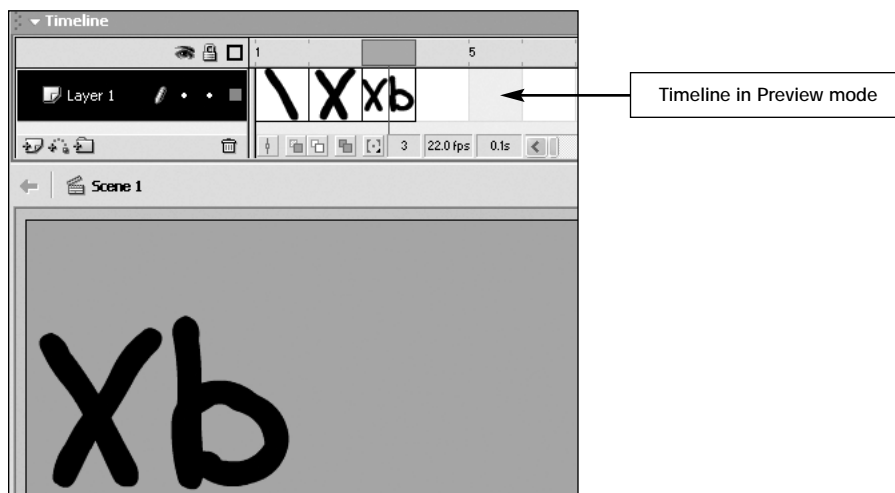


10. Now draw a **b** just like the picture above. Believe it or not, you have already created the beginning of your animation! You can click and drag (**scrub**) the **Playhead** back and forth in the **Timeline** to quickly preview the animation. You will see the "X" and the "b" being drawn directly on the Stage.

4. Animation Basics | Macromedia Flash MX H-O-T



Looking at a Timeline with a bunch of black dots might seem somewhat abstract to you. The Frame View menu has several options that allow you to display the contents of your individual frames right in the Timeline.



11. From the **Frame View** drop-down menu, select **Preview**. This will change your Timeline so that you see a preview of what is on each frame instead of a bunch of black dots. I find this view of the Timeline very helpful when creating frame-by-frame animations.

Note: If you had chosen white for the Brush color, you would not see the artwork in Preview mode since the Timeline frames are white also.

12. Press **F6** to insert another keyframe so you can continue to draw the pieces to spell out the word "Xboarding."

13. Using the **Brush** tool, draw an **o** on the **Stage**. You should be able to see the contents of your fourth frame appear in the Timeline preview.

As you continue to spell out the word “Xboarding,” you don’t have to draw the whole letter in each keyframe. Instead, you can draw a part of the letter (just as you did with the “X”) in one keyframe, press F6 to insert the next keyframe, and draw the remaining parts of the letter in that keyframe for a more realistic drawing animation.



14. Go ahead and continue to spell out the word “Xboarding” by pressing **F6** to add a new keyframe after the previous one and then adding more letters or parts of the letters in each one, using the **Brush** tool. When you are done, your Timeline should look like the one shown above.

You can get a quick preview of your animation right away using one of two methods. You can scrub the Playhead across the Timeline as mentioned in step 10, or you can press Enter/Return and watch the animation play directly on the Stage. So get out the popcorn and watch your first animation!

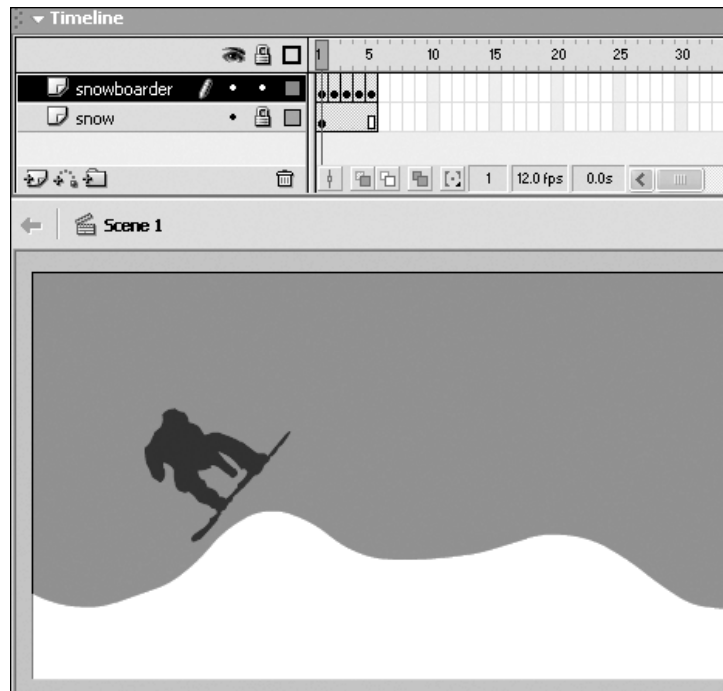
15. Press **Enter/Return**. Your animation will play once on the Stage and stop at the last keyframe. Unlike scrubbing the Playhead, this time you are seeing an accurate preview of the frame rate for this movie, which you set in the previous exercise: 22 fps. (Frame rate is covered in more detail later in this chapter.) Press **Enter/Return** to preview the animation again as many times as you like.

There are other ways to preview your animations that will be covered later. For now, this exercise is focused on the basics.

16. Save and close this file.

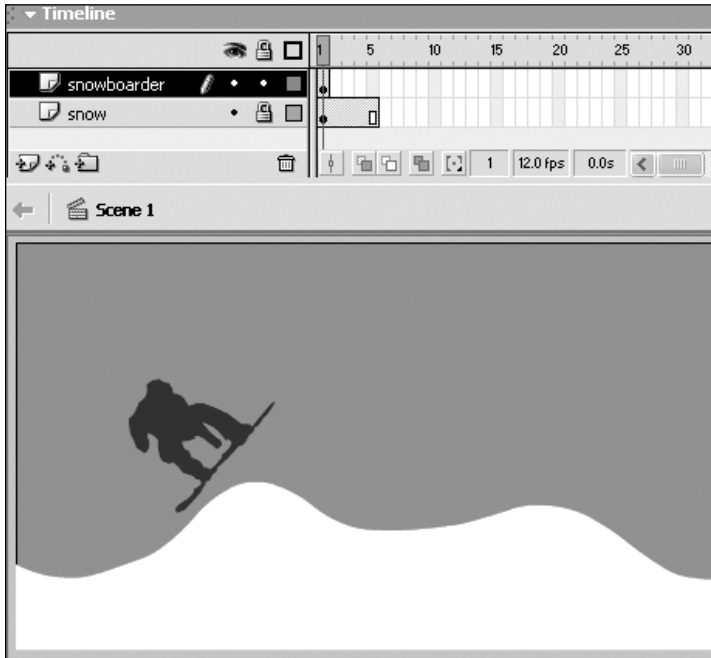
3. Onion Skinning

In the last exercise, you learned to work with keyframes and to add content to each new keyframe you inserted in the Timeline. This exercise will teach you a few new techniques. First, you'll learn to use the **Onion Skinning** feature. This feature allows you to see a ghost image of the previous frame so you can see where you want to place the artwork on each frame in relation to the frames before it. Next you will learn to use the new **Free Transform tool** to modify the artwork. This exercise will also teach you how to use a feature called **Loop Playback**, so you can preview your animation over and over until you get sick of it. Just kidding!



1. Open **onionFinal fla** file from the **chap_04** folder. This file has been created for you so that you can see the finished version of the exercise.
2. Before you preview the animation, choose **Control > Loop Playback**. This will allow you to see the animation repeat over and over when you preview it.
3. Press **Enter/Return** on the keyboard to preview the animation on the Stage. You will see the snowboarder catching some air! In the following steps, you will be creating this same animation technique. To stop the looping, choose **Control > Loop Playback** again.

4. Close the `onionFinal.fla` file.

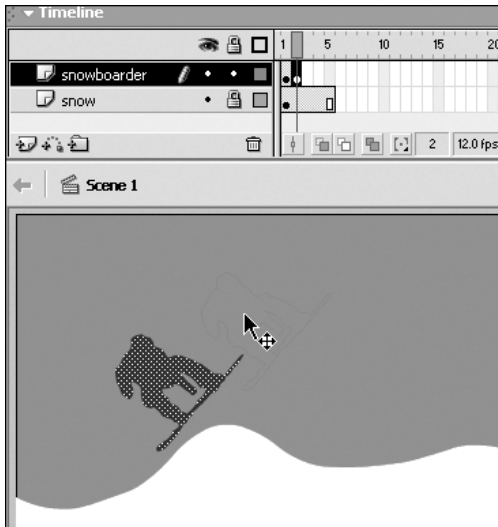


5. Open the `onion.fla` file from the `chap_04` folder. This file contains one keyframe with the snowboarder beginning his jump on the top layer and one keyframe with the snow on another layer. The layer named `snow` has been locked so that you don't accidentally select something on that layer. You will be altering only the artwork on the `snowboarder` layer in the next few steps.

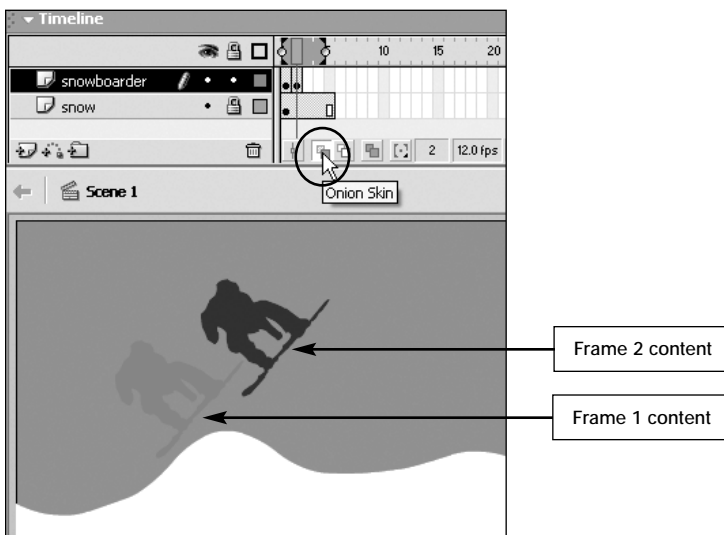
6. Select **Frame 2** and press **F6** to add a keyframe to the frame. Notice that Frame 2 is now a keyframe because it contains a small black dot, which signifies that it contains content.

If you press F6 without first selecting the frame where you want to add a keyframe, nothing happens. Why? When you have more than one layer in your document, you have to select the frame first in order for Macromedia Flash MX to know where you want to place the keyframe.

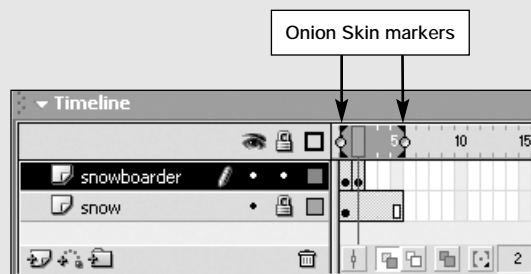
4. Animation Basics | Macromedia Flash MX H-O-T



7. In Frame 2, click on the snowboarder artwork to select it, and move it up and to the right, as though he is advancing in his jump.



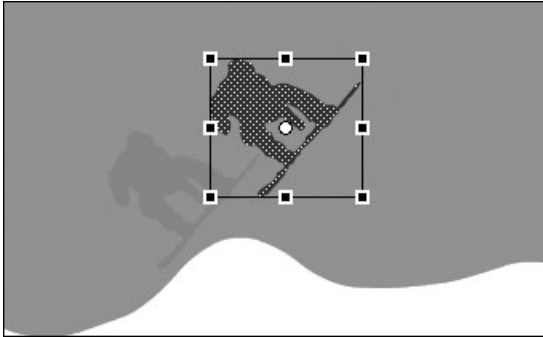
8. At the bottom of the **Timeline** is a row of five buttons. Click the second button from the left. This is the **Onion Skin** button. You will be able to see a faint ghost image of the content in Frame 1 on the Stage. This convenient feature allows you to see the artwork in the previous keyframes and change the artwork relative to the ghost images.

NOTE | Onion Skin Markers

After you click the Onion Skin button, a gray bar with a draggable bracket on each end appears at the top of the Timeline. These are called **Onion Skin markers**. The **Start Onion Skin** marker (the one on the left) is on Frame 1 (the start of your animation), and the **End Onion Skin** marker (the one on the right) is on Frame 5 (the last frame of your animation). If you click and drag your Playhead to the right or left and let go, the Start Onion Skin marker will move. Basically, Onion Skinning will move along with your Playhead. You can always drag one of the Onion Skin markers to include more frames if it is spanning fewer keyframes than you have in the Timeline.

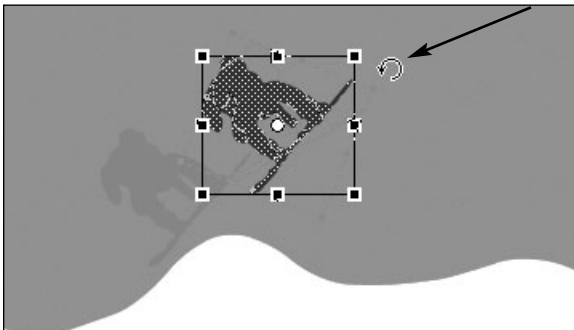


9. With **Onion Skinning** turned on, select the new **Free Transform** tool in the **Toolbox**. This tool allows you to modify your artwork by changing the size, rotation, skew, and distortion of the selected artwork. The chart at the end of this exercise illustrates the functions of the Free Transform tool.



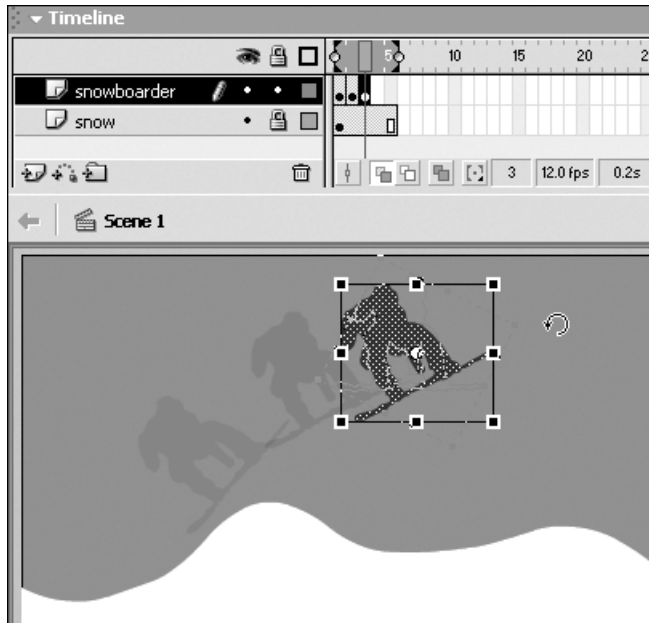
10. With the **Free Transform** tool selected, click on the snowboarder in Frame 2 to select the shape, if it is not already selected. Notice the bounding box that appears around the artwork. This box indicates that you can transform the artwork.

If you move the cursor over different parts of the selected artwork, the cursor will change to indicate what transformation function is available.



11. Move your cursor just outside the upper right corner of the bounding box until it changes to a round arrow, as shown in the picture above. This icon indicates that you can rotate the artwork. Click and drag to the right to rotate the snowboarder a bit and make the jump look more realistic.

12. Select **Frame 3** and press **F6** to insert another keyframe so you can create the third frame of your animation.

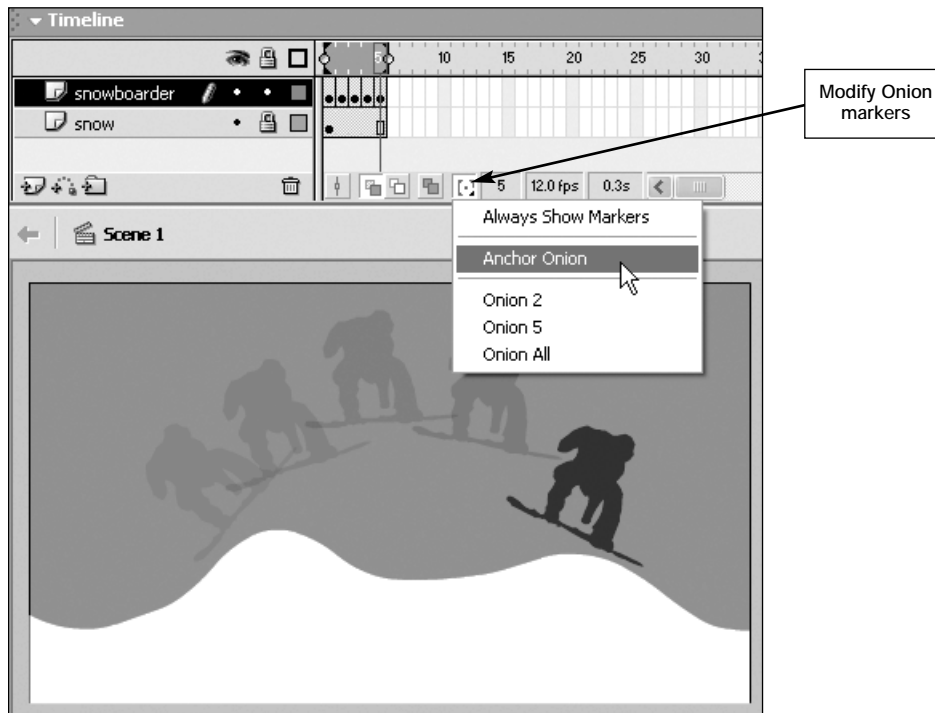


13. With Onion Skinning still turned on, select the snowboarder artwork in **Frame 3** and move it to the right. Select the **Free Transform** tool and rotate the snowboarder again, just as you did in step 11.

14. Finish off the snowboarder jump by repeating steps 12 and 13 twice more, adding two more keyframes to Frames 4 and 5 and modifying the artwork in each keyframe.

15. Choose **Control > Loop Playback** so that you can see the animation repeat over and over.

16. Press Enter/Return to test the movie. You will see the snowboarder catching some air!



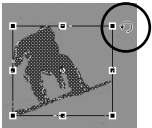
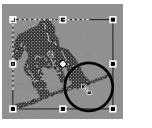
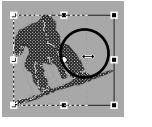
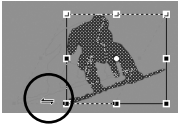
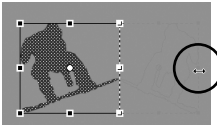
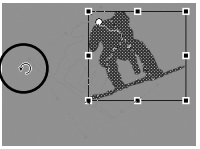
If you do not want the Onion Skin markers to move when you move the Playhead or click on a frame in the Timeline, you can choose Anchor Onion from the menu that appears when you click the Modify Onion Markers button at the bottom of the Timeline. This will lock the Onion Skinning span where it is until you unlock it again or manually drag the Start or End Onion Skin markers.

17. You will have the chance to work with the other features of the Free Transform tool in Chapter 6, "Symbols and Instances." For now, save and close this file.

NOTE | The Free Transform Tool

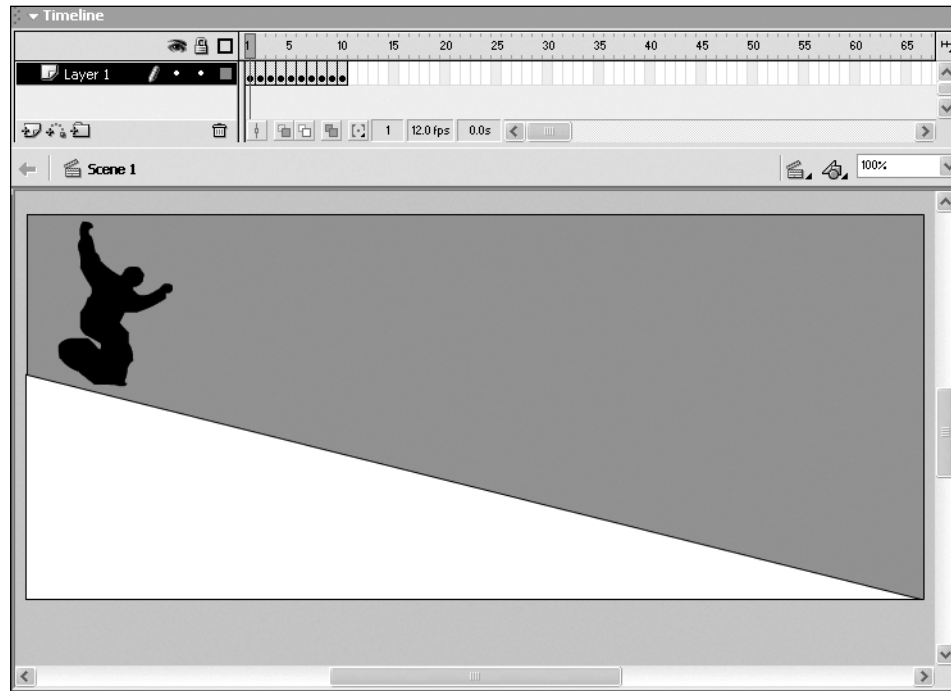
You can use the Free Transform tool to modify objects in several ways. As you move the cursor over the bounding box around a selected object, it will change to indicate what type of transformation is available to you. As you drag, you will see a preview of the transformation you are about to make. The chart below lists the features of the Free Transform tool.

Free Transform Tool Functions

	<p>Clicking and dragging up or down on a corner transform handle will rotate the object. The cursor icon will change to a round arrow, as shown in the image at left. This arrow indicates that you can rotate the object.</p>
	<p>Clicking and dragging diagonally on one of the corner transform handles will modify the scale of the object. The cursor icon will change to a diagonal double-headed arrow when you can perform this transformation.</p>
	<p>Clicking and dragging on one of the middle side transform handles will modify the width or height of the object. The cursor icon will change to a horizontal (or vertical depending on which side you are on) double-headed arrow when you can perform this transformation.</p>
	<p>Clicking and dragging between any two transform handles will skew the object. The cursor icon will change as shown at left. This icon indicates that you can skew the object.</p>
	<p>Clicking and dragging one of the middle side transform handles to the other side of the object will flip the object. The cursor will change to a horizontal or vertical double-headed arrow depending on which side you are on.</p>
	<p>Clicking and dragging the center registration point will modify the center point of the object. After you alter the center point, all transformations will rotate or move in relation to the new center point location.</p>

4. Understanding Frame Rate

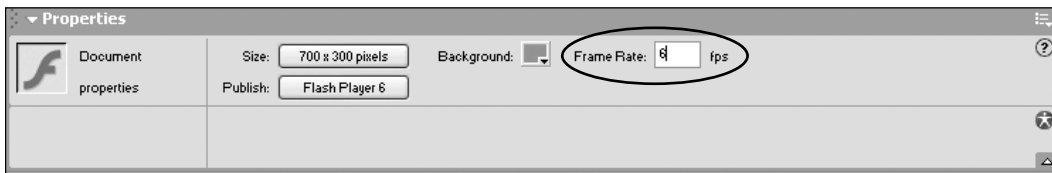
Now that you have created a couple of frame-by-frame animations, it's time to investigate the Frame Rate setting of your movie. The **frame rate** defines how many frames your animation will try to play in one second. I use the word "try" because there is no guarantee that your movie will play back at the specified frame rate, due to the varying processor speeds of the computers that your end users might use. In the following steps, you will start by opening a file that contains a simple frame-by-frame animation of a snowboarder moving down a mountain. You will test the animation to preview the current frame rate and then lower the frame rate to see the impact it has on playback speed.



1. Open the **properties.fla** file located inside the **chap_04** folder. This file contains one layer with a frame-by-frame animation of a snowboarder cruising down a mountain.

2. Press **Enter/Return** to watch the animation play on the Stage. The animation will play at the default frame rate of 12 fps.

3. Make sure the **Property Inspector** panel is open. If it is not, choose **Window > Properties** or press **Ctrl+F3** (Windows) or **Cmd+F3** (Mac) to open it.



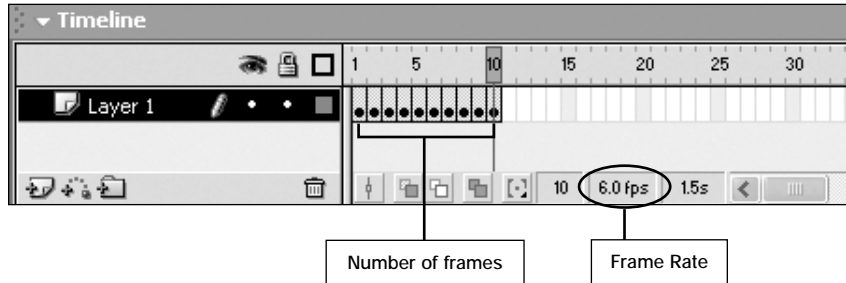
4. In the **Frame Rate** field, enter **6**. This will lower the frame rate to 6 frames per second, reducing the speed of the animation by half.

5. Press **Enter/Return**. Notice that the animation plays much more slowly and kind of stutters. You are taking twice the time to play the same number of frames. The lower the frame rate, the slower the animation will play.

6. Save and close this file; you won't need it for the next exercise.

What Is the Frame Rate?

The frame rate determines the number of frame your movie plays per second. This rate corresponds directly to the length of time your animation takes to play.



Here's how to use the frame rate to calculate the playback time of your animation. Take the total number of frames in your Timeline and divide that by the frame rate; the result is the number of seconds it will take to view your movie.

For example, if your Timeline has 10 frames and your frame rate is set to 6 FPS (frames per second), your animation will display in 1.67 seconds. The chart below gives several examples of how the frame rate affects the length of time an animation takes to play.

Number of Frames	/	Frame Rate	=	Time
24 frames	/	12 fps	=	2 seconds
36 frames	/	12 fps	=	3 seconds
48 frames	/	24 fps	=	2 seconds
72 frames	/	24 fps	=	3 seconds

It is important to note that the frame rate affects all of the animations in your movie. In the next exercise you will learn how to make animations play at different speeds in the same Timeline.

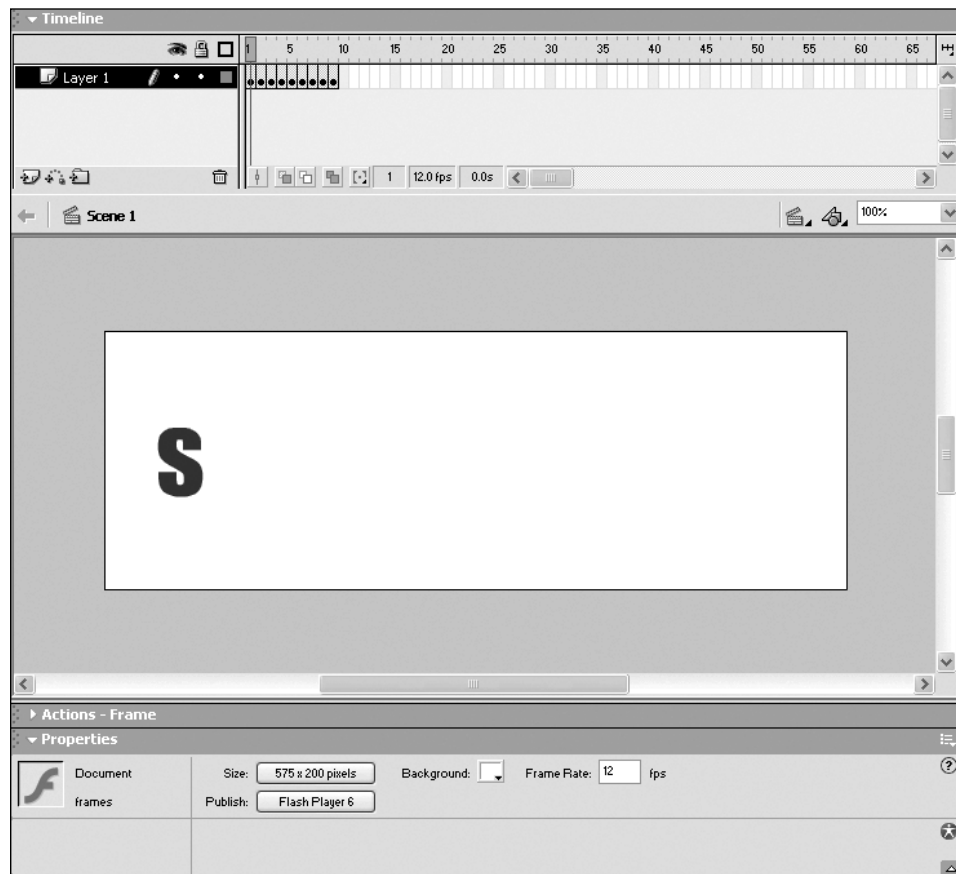
Recommended Frame Rates

When you set a frame rate in Macromedia Flash MX, you've set the *maximum* frame rate for your movie, or how quickly the movie “tries” to play. The actual playback frame rate depends upon several factors, including download speed and the processor speed of the computer viewing the movie. If the frame rate is set higher than the computer can display, the movie will play as fast as its processor will allow. So if you set your frame rate to 200 (which is really high), the average computer will not display the movie at that rate. Here's another wrinkle: Frames that have more objects, colors, or transparency than others take more time for the computer to render. Thus, the actual frame rate can vary during playback due to the rendering requirements from one frame to another.

Based on all this information, I would recommend that you use a frame rate of at least 12 fps and not more than 25 fps, so that the average computer can display your movie as you intended. A frame rate of 20 to 22 fps seems to work well most of the time. This rate is very similar to that used in motion pictures, which typically play at a frame rate of 24 frames per second.

5. Inserting and Deleting Frames

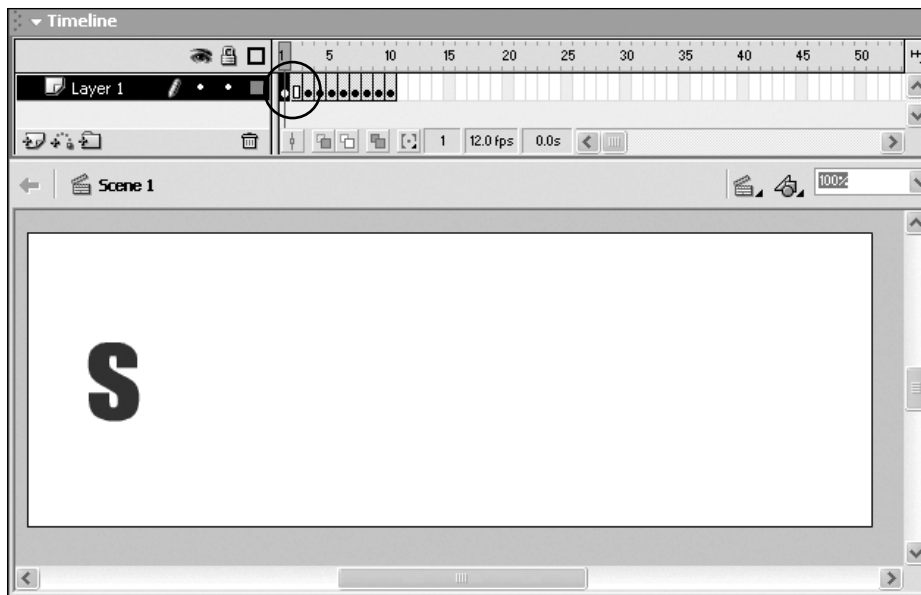
As you learn to create frame-by-frame animation and other types of animation, you will at some point want to adjust their speed. In the previous exercise, you learned that adjusting the frame rate will do just that, but it affects the entire movie. That might not be what you want to do, so in this exercise, you will learn how adding and removing frames in your Timeline can help control the timing of your animation. This means that you can have multiple animations playing at different tempos, even though they all share the same frame rate.



1. Open the **frames.fla** file from the **chap_04** folder. This file contains a simple frame-by-frame animation with some text. You'll be learning more about how to use text in Chapter 12, "Working with Text!"

2. Press **Enter/Return** to preview the animation on the Stage. The animation will play pretty quickly. In fact, it's playing so fast that you almost lose the effect of the text appearing one letter at a time.

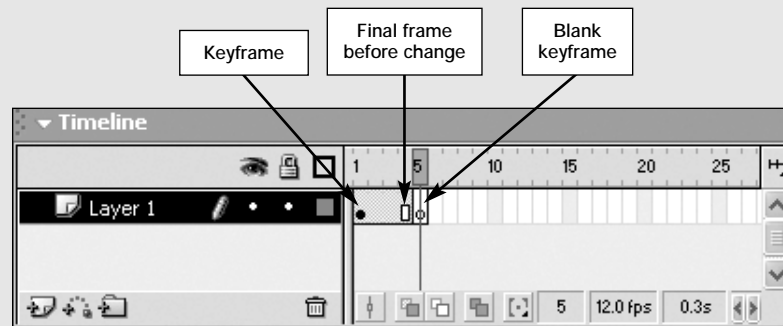
If you adjust the frame rate to slow down this animation, it will also affect every other animation in this project. This could cause some serious problems if you wanted other sections of your movie to play at a different speed. So you must find another way to slow down the animation. One way to do this is by inserting frames at strategic points to lengthen parts of the animation. That's exactly what the following steps will show you how to do.



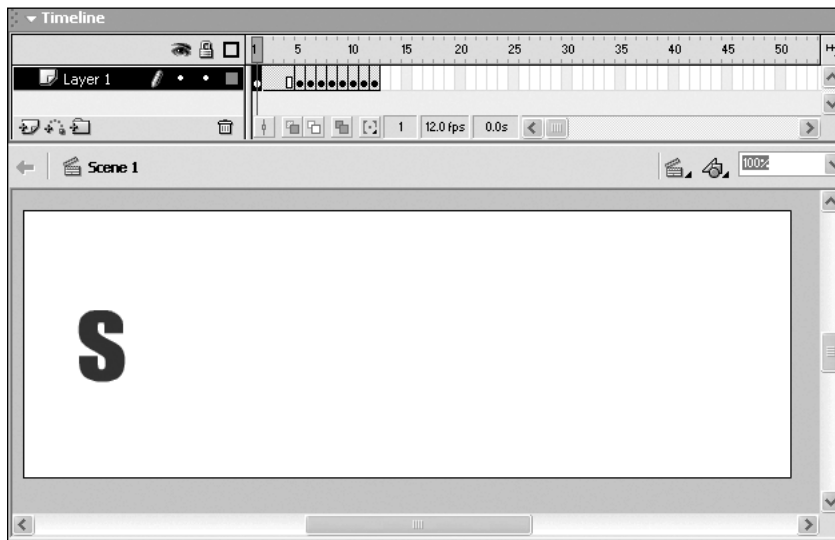
3. Click in **Frame 1** of **Layer 1**, and choose **Insert > Frame** or use the shortcut key **F5**. This will insert a frame between Frames 1 and 2, extending the Timeline by one frame.

4. Press **F5** to insert another frame. Each time you choose **Insert > Frame** or press **F5**, you will insert one frame and extend the Timeline.

TIP | What Do Those Dots Mean?

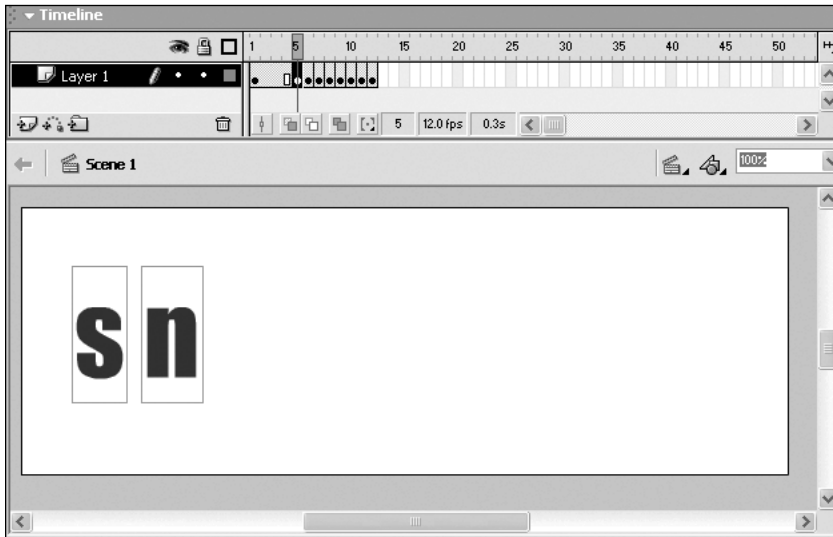


As you start adding content to your Timeline, you will notice different icons appearing in your Timeline. The black dots indicate keyframes. The light gray frames after the keyframe indicate no change in content. The small white square inside a light gray frame indicates the ending point of a frame range, which also means that the next frame will be a blank keyframe or a keyframe. The white frame with a hollow circle, directly after the frame with a hollow square, is a blank keyframe.

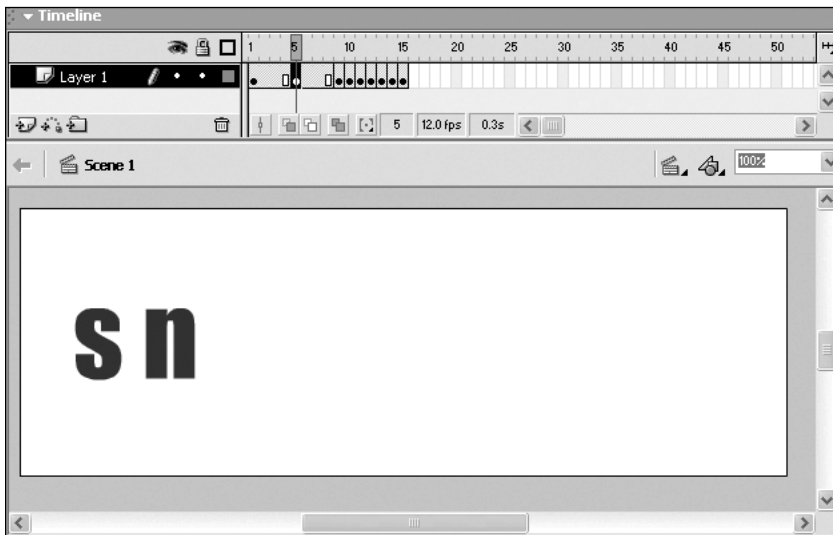


5. Press F5 again so that you have a total of three additional frames between your first two keyframes. By extending the space between the first two keyframes in the Timeline, you are able to control the timing of the animation, as your image will display for a longer period of time.

6. Press **Enter/Return** to preview the animation on the Stage. Now there is a noticeable delay between the letters “s” and “n.”



7. Click in Frame 5 of the Timeline. This is where the second keyframe should be located.



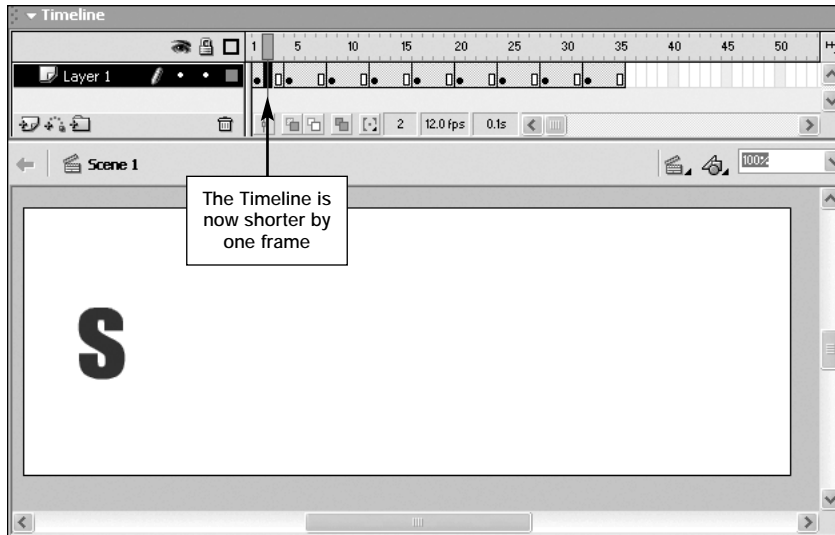
8. Press **F5** three times to insert three frames in the Timeline. This will create a short pause between the letters “n” and “o.”



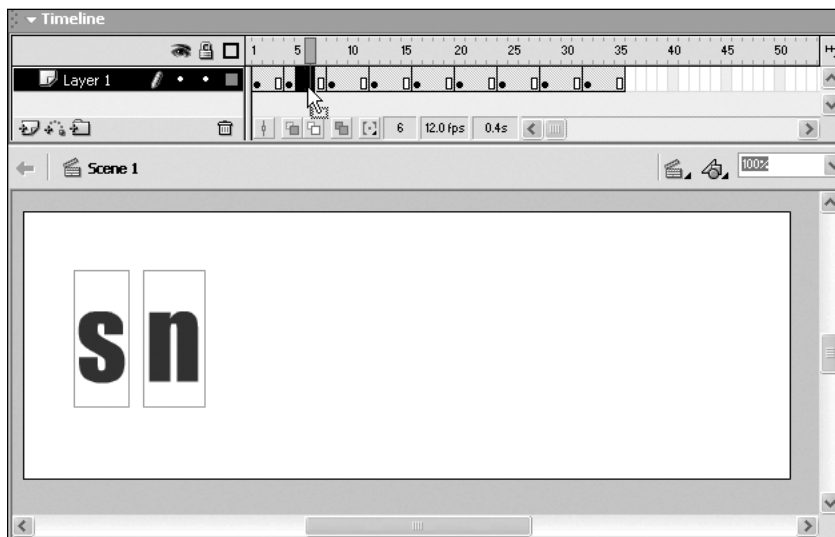
9. Repeat this process for the other letters in the animation. When you are finished, your Timeline should look like the one shown above.

10. Press **Enter/Return** to preview your animation on the Stage. See how much slower the entire animation plays—and you didn't have to touch the frame rate for the movie. Nice.

Great—you now know that you can control the timing of individual animations without having to adjust the frame rate of your entire movie. You have just seen that by inserting frames you can slow down an animation, so it should be no surprise that you can increase the timing of the animation by deleting frames. You will learn how to do this next.



11. Click on Frame 2 of the Timeline and choose **Insert > Remove Frames**. This will remove the selected frame, shortening your Timeline by one frame and decreasing the amount of time between the “s” and “n” letters in your animation.

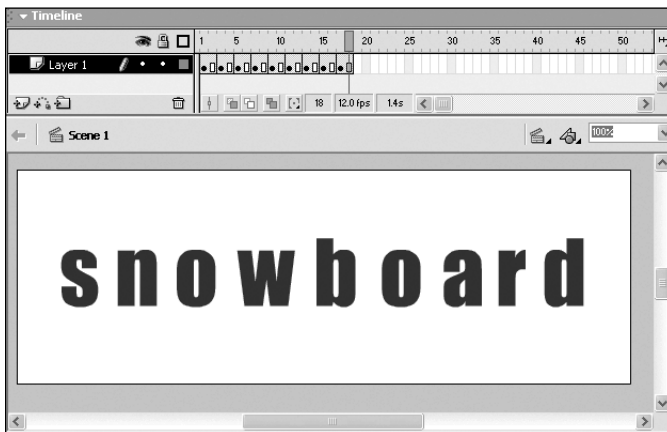


12. **Ctrl+click** and drag (Windows) or **Cmd+click** and drag (Mac) and select Frames 5 and 6. This lets you select a specific range of frames. Make sure you hold the appropriate key down as you click and drag; otherwise you might accidentally move keyframes around.

4. Animation Basics | Macromedia Flash MX H•O•T



13. With Frames 5 and 6 still selected, choose **Insert > Remove Frames**. This will remove the selected frames and shorten your Timeline by two frames.



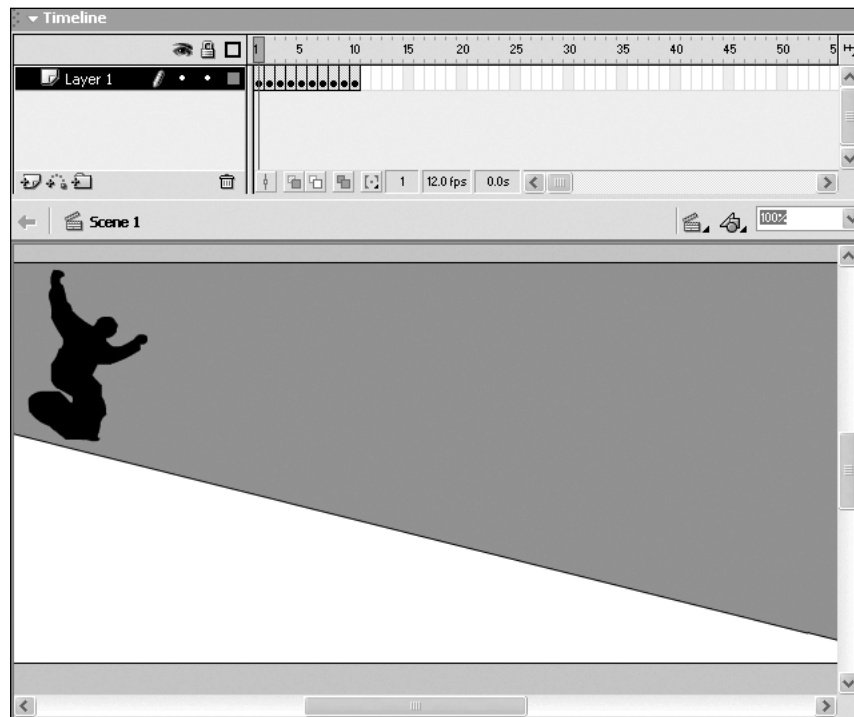
14. Go ahead and use **Shift+F5** (the keyboard shortcut for removing frames) to remove the frames between each of the keyframes in the Timeline (including the ones between Frames 1 and 4) so that there is only one frame between every two keyframes. When you're finished, your Timeline should look like the one shown above.

15. Press **Enter/Return** to preview your animation on the Stage. The animation will play much faster than it did before, because there are fewer frames between the keyframes. Now you know at least two ways to speed up or slow down the timing of your animation.

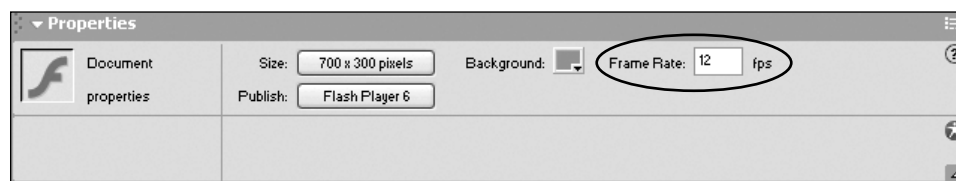
16. Save and close this file.

6. Copying and Reversing Frames

Creating a looping animation (one that repeats indefinitely) can be a lot of work if you have to draw all the frames over and over. In Macromedia Flash MX, you can quickly and easily copy, paste, and reverse a sequence of frames to create a looping animation. You will learn to do this in this exercise.

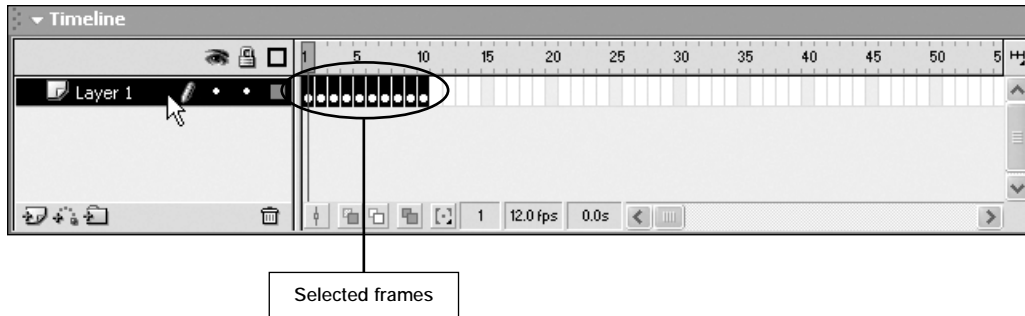


1. Open the **properties.fla** file from the **chap_04** folder. This is the same file you worked on earlier.

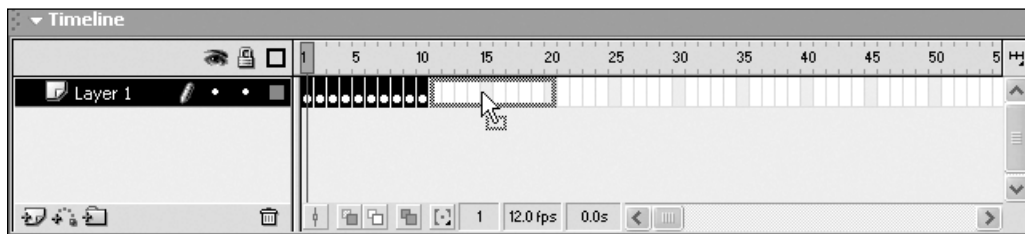


2. Using the **Property Inspector**, make sure the **Frame Rate** is set back to 12.

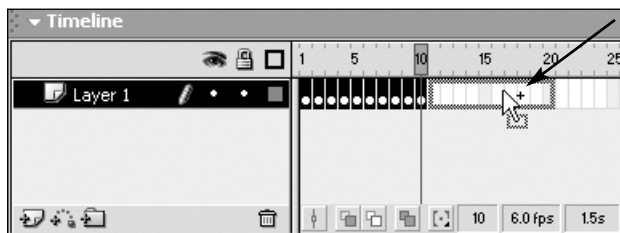
4. Animation Basics | Macromedia Flash MX H•O•T



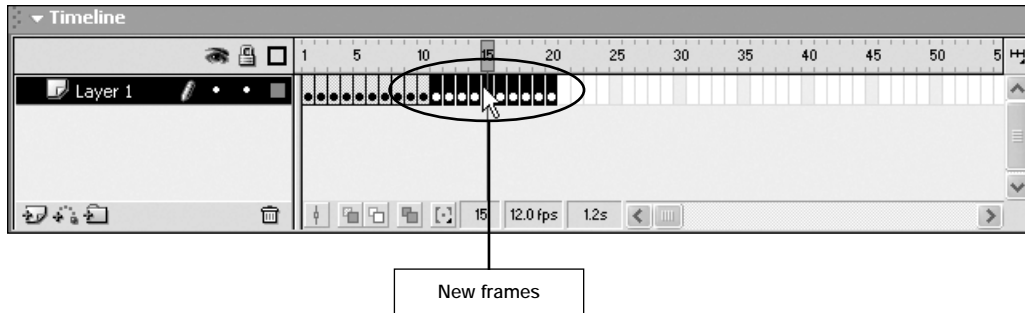
3. Click to the right of the layer name. This is an easy way to select all of the frames on a layer. Before you can copy a range of frames, you want to make sure you have selected them first.



4. Move your cursor over the selected frames. Click and drag to the right. But don't release the mouse button just yet! **Note:** The light gray outline surrounding the frames indicates where they'll be moved when you release the mouse button.



5. While still holding the mouse button down, press the **Alt** (Windows) or **Option** (Mac) key. Notice that a small plus sign appears to the right of the cursor. This indicates that you will duplicate, not move, the frames when you release the mouse button.



6. Release the mouse button. This will place a copy of the selected frames in Frames 11 through 20.

7. With Frames 11 through 20 still selected, choose **Modify > Frames > Reverse**. You won't see any noticeable reversal in your Timeline, but you will when you test the movie.

8. Press **Enter/Return** to preview your animation on the Stage. The snowboarder will race down the hill and then go backward up the hill, as if you were rewinding the film to view an instant replay! Neat! If you choose **Control > Loop Playback**, you can watch the animation preview loop endlessly.

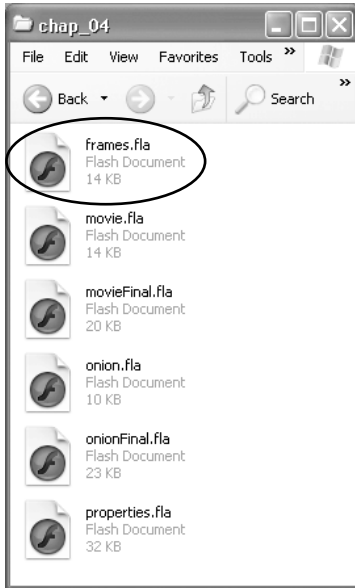
9. Save and close this file.

7. Testing Movies

So far, you've been testing your movies by pressing Enter/Return and watching them play on the Stage. This is a great way to test the frame rate, but there are other ways to test your work. In this exercise, you will learn how to preview the movie file (.swf) with the **Test Movie** feature and how to preview your movie in a browser with the **Preview in Browser** feature. You will also learn a really easy way to produce the HTML file needed to hold your .swf file. More in-depth instruction on publishing Macromedia Flash MX content is provided in Chapter 16, "*Publishing and Exporting*".



1. Open the frames fla file from the chap_04 folder.



This file should have been saved inside the chap_04 folder. It is important to know where your project file (.fla) has been saved before you use the Test Movie and Preview in Browser features, because as you'll see, Macromedia Flash MX automatically generates new files and saves them with your project files when you use these features. If you saved your file in a different location, make sure you know where it is.



2. Choose Control > Test Movie. This will open a new window with a preview of the movie file(.swf) that would be exported if you chose to publish your movie right now.

Tip: You can click on the resize handle of the Preview window and drag to make your window larger. Although the size of the window will change, the snowboard letters will stay the same size. You will learn how to make the content scalable, also using the publish settings, in Chapter 16.

TIP | Loop-de-loop

At this point, you're probably wondering why your animation is looping (playing over and over). This is the default behavior of all movies in Macromedia Flash MX, although you don't see it when you simply press Enter/Return to preview your work (unless you've set the file to Loop Playback). If you uploaded your published file to the Web, however, it would loop. You will learn to control the looping in your final movie (.swf) file in Chapter 11, "ActionScripting Basics," when you learn how to add actions to frames. If all this looping is making you dizzy, you can select **Control > Loop** to deselect this feature and turn it off temporarily.

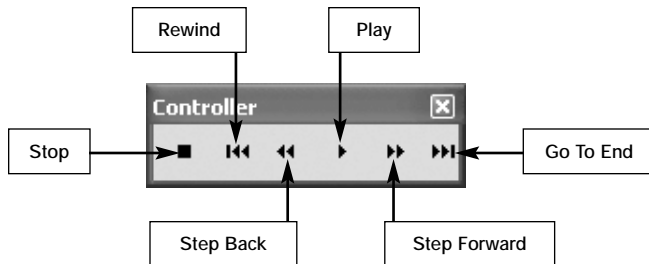


3. With the .swf file still open, choose **Window > Toolbars > Controller** (Windows) or **Window > Controller** (Mac). You'll see a small toolbar on your screen that looks like the front of your VCR or other media player. This handy little gadget helps you control the playing of your animation.



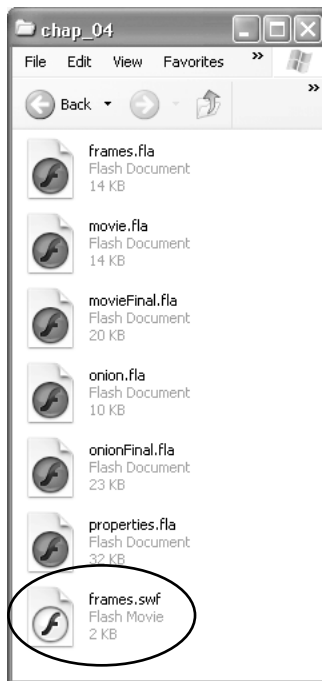
Stop button

4. Click the **Stop** button. As you probably guessed, this stops your animation.



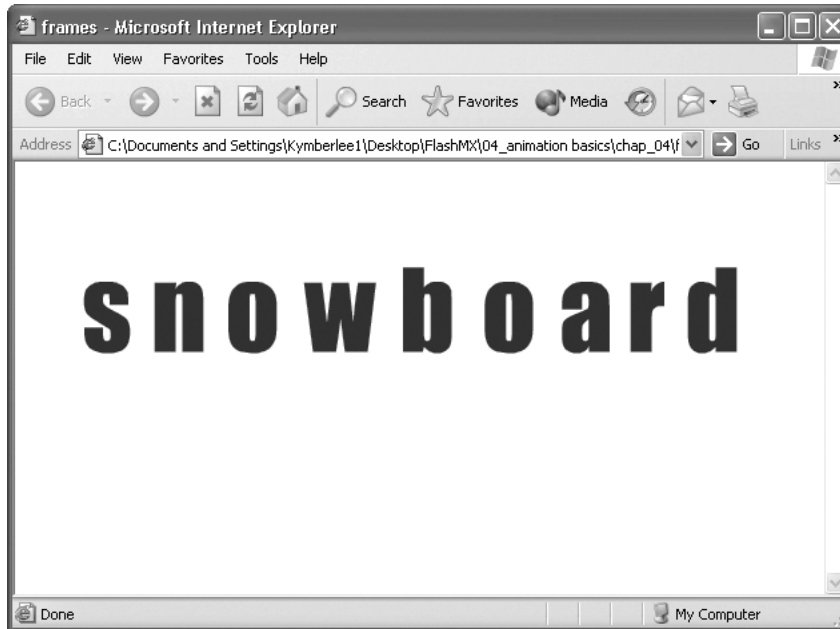
5. Click the **Play** button. Yes, you guessed it; this plays your animation. Go ahead and take a few minutes to try the other buttons on the Controller.

Something else happened, behind the scenes, when you chose Control > Test Movie. Macromedia Flash MX automatically created the .swf file for this movie and saved it in the same location as your project (.fla) file. You'll locate this file next.



6. Open the **chap_04** folder from your desktop. Notice that there is a **frames.swf** file inside this folder. This file was automatically generated by Macromedia Flash MX. Also notice that the .swf file has a different icon than the .fla files. This can be helpful visual feedback, especially if your file extensions are turned off. The .swf file is the file that you would add to an HTML page, much as you would a .gif or .jpg file.

7. Return to Macromedia Flash MX and close the Preview window.

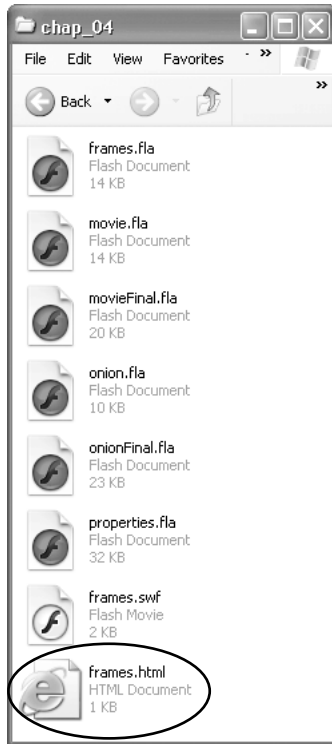


8. Choose File > Publish Preview > Default – (HTML) or use the shortcut keys Ctrl+F12 (Windows) or Cmd+F12 (Mac). This will launch your default browser with a preview of your movie file (.swf) inside the browser window. This command provides a quick and easy way to see what your movie files will look like in a browser. You will learn a more appropriate and formal way of publishing your Macromedia Flash movies later in Chapter 16, "Publishing and Exporting."

Again, something extra is happening behind the scenes. When you preview your movie in a browser, Macromedia Flash MX will automatically create an HTML file, as well as the .swf file if there isn't one already, in the same location as the project file (.fla). So make sure you always know where you're saving your project files.

NOTE | How Does Macromedia Flash MX Know Which Browser to Use?

If you have several browsers installed on your system, you can specify which one Macromedia Flash MX uses as the default browser. You can change the default browser to your preferred browser in a few steps. There's a great explanation of how to do this for either a Windows machine or a Macintosh on Macromedia's Web site: http://www.macromedia.com/support/flash/ts/documents/browser_pref.htm.



9. Hide Macromedia Flash MX for a moment and look inside the **chap_04** folder on your desktop. Notice that there is a **frames.html** file inside this folder. Macromedia Flash MX generated this file automatically to hold your **frames.swf** file.

At this point, all the files necessary to publish to the Web have been generated automatically. More thorough instructions and details are provided in Chapter 16, "Publishing and Exporting." This exercise simply demonstrated a quick and easy way to generate files.

10. Return to Macromedia Flash MX and save the changes you made to this file. You can close this file—you are finished with this chapter! It was a long but essential part of your animation training.

Well, that's about it for the basic stuff. The next three chapters deal with more complex and specific issues, such as symbols and instances, motion tweening, and shape tweening. Now would be a great time for a break—you've worked through a lot of material, and you deserve one!