Beginning web animation with Macromedia Flash MX

Macromedia Flash is the de facto standard application for authoring rich media content on the World Wide Web. This course will teach you how to use Flash MX, Macromedia's latest and most advanced version of the software. We'll cover the basics for new users and set you on the right track to creating rich media Web sites of your own.

Lessons

1. What is Flash?
   This lesson discusses the basics of Flash and contains all the information you need to begin using Flash. We briefly mention the core concepts of Web development, and then discuss the pros and cons of using Flash content. You'll also see some example uses of Flash movies on the Internet.
2. Learn the Flash interface
   This lesson teaches you the basics of the Flash authoring tool. You set up your movie properties, learn the functions of the tools palette, and draw graphics for use in the example movie Face Facts. You learn how to use the timeline, layers, and other panels that you'll often find indispensable.
3. Animate the face
   In this lesson, you learn the terms and methods used in the Flash animation process. You then apply what you've learned to the Face Facts project and animate the face you drew in Lesson 2.
4. Add ActionScript to your movie
   In this lesson, you transform Face Facts from animation into interactive media by adding user control via buttons and ActionScript. You learn to import images into Flash and to add text with the Text tool.
5. Publish for everyone
   The Web is a medium for making information available to everyone, so you need to ensure that your content is accessible even to people with disabilities. This lesson gives reasons why accessible content publishing is the right thing to do and shows you how to make your Flash movie more accessible and usable to everyone. Then you'll finally get to publish your movie.
6. Keep learning
   This course teaches you the basics of Flash publishing, but Flash has much, much more to offer. This lesson discusses what you've learned and where to go to find more information.

What is Flash?

This lesson discusses the basics of Flash and contains all the information you need to begin using Flash. We briefly mention the core concepts of Web development, and then discuss the pros and cons of using Flash content. You'll also see some example uses of Flash movies on the Internet.

Let's get started

Welcome to Beginning Flash MX. This course teaches you how to use Macromedia Flash MX, a program for authoring and viewing multimedia content on the Web.

What to expect from this course

First, we go over a few topics to get everyone up to speed. Some students may know nothing about Flash except the name, whereas others may have already used Flash, so there'll be a brief introduction to what Flash is and how it's used. You also learn the basics of Web development, how the Flash program fits into the picture, and some benefits of using Flash.

In Lesson 2, you set up your Flash program and begin learning how to use it. Drawing in Flash differs from every other drawing program available, so learn how to use each of the different drawing tools. You also learn what the timeline is and try your hand at beginning animation techniques.

Get the software

Macromedia Flash MX is the "must have" tool used by over one million professionals to deliver the best user experiences on the web, increasing both revenue and customer satisfaction while lowering costs.

» Macromedia® Flash 8

In Lessons 3 and 4, you get a feel for more advanced techniques, such as making symbols and storing them in a reusable library. You also learn the basics of ActionScript, Flash's built-in scripting language. (Don't worry; we won't delve too deeply into the code.)

In Lesson 5, we discuss ways to make your Flash Web site accessible to everyone, as well as a variety of different ways to publish your Flash content. The key objective here is inclusive Web design.

Finally, Lesson 6 presents best-practice techniques and common mistakes that beginning Flash users make. If you want to learn more, we provide you with topics to research and a list of resources, such as links, forums, and discussion groups.

What to expect from this lesson

This lesson discusses the concepts that you should know before starting this course. We talk a little bit about the history of the Internet, differences in image file formats, how Flash came to be, and what Flash is. After you've learned this information, you encounter the pros and cons of using Flash. The lesson closes with some advanced examples of Flash on already existing Web sites to give you a few ideas of what can be achieved by using Flash.

What you need to know

The Internet, as it exists today, was started in the early '90s by scholars and researchers as a way to share documents and research papers electronically. They developed a simple method called HTTP (Hypertext Transfer Protocol) for trading files, and a simple format called HTML (Hypertext Markup Language) for those files. Virtually every Web site you've ever seen (including Flash Web sites) has used these two technologies.

HTML, though a grand idea, did not originally offer much control over presentation of documents. Soon, the language grew to include the option for images, colors, and more visual style. Web designers began to use HTML and constantly asked for more and more control over presentation. It quickly became obvious that the language could only go so far to please everyone, and the researchers thought much of this control would be better suited to alternate technologies.

Some of these alternate technologies, such as JavaScript and CSS (Cascading Style Sheets), were designed to work seamlessly alongside HTML. JavaScript adds interactivity and functionality to Web pages whereas CSS allows a large amount of control over style properties such as colors, fonts, and layout.

Unfortunately, not every technology could be designed this way because there weren't enough resources to cover all the possibilities and features people requested, so the designers of HTML decided to make a standard way to include, or embed, other functionality and content into a Web page. These other technologies could be developed by third parties and embedded in an HTML document by the use of a plug-in. A plug-in is a small piece of software that adds functionality to a computer program. In the case of Flash, you use a plug-in to add functionality to a Web browser, such as Microsoft Internet Explorer, AOL, or Netscape Navigator. Macromedia Flash is an embedded technology.

Explore graphic formats

Another concept you need to understand to learn Flash is the difference between the two main types of graphic formats: raster and vector.

A raster graphic is made up of a grid of pixels, or small dots of color, that when viewed together, give the appearance of an image. Raster is the most common image format on the Web and most raster formats are very well suited for detailed images, such as photographs. Graphic file formats such as JPEG (Joint Photographic Experts Group), GIF (Graphic Interchange Format), and BMP (Bitmap) are all raster graphics.

A vector graphic is made up points, lines, and shapes. Vector graphics are very well suited to line art, corporate logos, icons, and cartoon-like illustration. Some examples of vector graphic file formats are EPS (Encapsulated Post Script) and SVG (Scalable Vector Graphics).

These definitions may be confusing for some of you, so look at Figure 1-1. As they say, a picture is worth a thousand words.

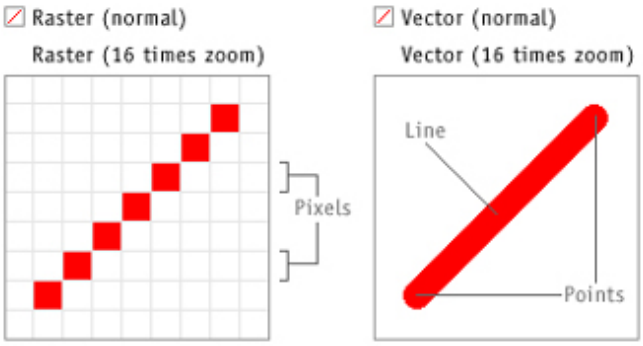


Figure 1-1: A close-up view of the differences between vector and raster graphics.

Figure 1-1 is a raster graphic, even though the right half represents a vector graphic.

The 45-degree line in Figure 1-1 clearly shows that the raster graphics are pixel-based and vector graphics are line-based.

The vector version is saved as two points connected by a line. No matter how large this graphic is scaled, it can still be represented as a smooth line. The raster version is represented as seven separate square pixels, each one-pixel over and one-pixel up from the preceding. This method loses quality when scaled and displays a jagged, instead of smooth, line.

Another benefit of vector graphics is smaller file size based on scalability. No matter how large the graphic is, it's still represented by two points and a line. The raster version is saved as a nine-by-nine pixel grid making 81 total pixels. At 16 times zoom, in order to maintain the same amount of quality, the raster version requires 20,736 pixels.

Flash MX can incorporate both vector and raster images into a Flash movie. Now that you know the difference, you can understand when it's appropriate to use each type to keep file size at a minimum.

So what, exactly, is Flash?

Macromedia Flash is the de facto standard application for authoring rich media content on the Web.

As previously mentioned, Macromedia Flash is one of the Web technologies that can be embedded in an HTML document. It's an all-inclusive way to serve multimedia content (such as text, graphics, animation, interactivity, audio, and video) to the viewer. There are other embedded technologies available for Web multimedia, but the popularity and adoption rate of Flash is so large that it has become the only one worth seriously considering if you'd like a large audience. Macromedia statistics claim that about 545 million Flash Players have been downloaded, and that more than 98 percent of Web users have the capability to receive Flash content.

Understand the terms

Throughout this course, you'll see the word Flash used in a couple of different ways. It's very important that we clearly define the difference before continuing.

The Macromedia Flash Player is a Web browser plug-in for viewing Flash content over the Web. The Flash Player is free and can be downloaded from the Macromedia download Web site . You may want to ensure you have installed the latest version of the Flash Player before continuing this lesson.

The Macromedia Flash Authoring Tool or Flash Program is a commercial software application available for Windows and Macintosh Operating Systems. Only people interested in creating Flash content need to install the Flash Authoring Tool. Students interested in following the lessons and exercises should purchase and install the Macromedia Flash MX Authoring Tool on their computer. Studio MX, another Macromedia product, includes Flash and several other applications, such as Dreamweaver and Freehand, which work well with Flash and would be of benefit to many students. If you haven't purchased Flash MX, consider the Studio MX package as an alternative.

The Macromedia Web site offers a free trial version of Flash MX. The trial version should be suitable for the course material; however, serious Flash authors should purchase a license before the trial version expires.

Let's take a look at some pros and cons of using Flash.

Pros and cons: why use Flash?

The main benefit of using Flash is that it can add richly interactive content to your Web pages. However, some other technologies, such as DHTML, offer a similar capability to add interactive content. We need to discuss the differences between these technologies to give you a clear view of the pros and cons of using Flash.

Flash versus DHTML

First, what is DHTML? DHTML (Dynamic Hypertext Markup Language) simply refers to the creative combination of HTML, JavaScript, and CSS. DHTML enables Web page authors to add interactivity to their Web sites without being dependent on a plug-in. Although this independence is a benefit for DHTML, it can also be a hindrance. The problem arises because not all Web browsers are the same.

You may have heard the term cross-browser. Cross-browser compliance refers to Web pages and code that display and work well in a variety of Web browsers. Similarly, cross-platform means that something works well on multiple operating systems, such as Windows, Macintosh, and even Linux.

As beginning Flash users, you won't be expected to test every possible browser combination, but serious Flash authors test many browsers to ensure that their work can be used in as many browsers as possible. The following list contains just a few of the Web browsers available.

- Internet Explorer
- Netscape Navigator
- Apple Safari
- Opera
- AOL
- Mozilla / Firebird / Camino
- Lynx
- Various handheld devices such as mobile phones

The first major benefit of Flash over DHTML is the consistency of the Flash Player as a presentation medium. Web developers using DHTML interfaces have always been plagued by differences between various Web browsers; for example, some code that works on Internet Explorer may not work on Netscape Navigator, or vice versa. Because Macromedia controls the Flash Player, developers can ensure a cross-browser, cross-platform medium for presentation of Web content. This gives you, as a Web developer, the piece of mind that any Web user can view and access your content in exactly the same way, assuming there is a Flash Player plug-in developed for that user's browser.

Another major benefit of Flash is the file size. Flash has the ability to use and animate vector graphics. As we discussed, a vector graphic is made up of lines and points instead of pixels. Using vector graphics for most of your Flash movie can keep the file size much smaller than an equivalent DHTML interface.

Flash MX adds many advanced features, such as better integration with audio and video. Seamlessly incorporating audio and video into DHTML is difficult, if not impossible.

Flash disadvantages

Unfortunately, Flash has its drawbacks, too. As we mentioned, viewing Flash content requires the user to have installed the Flash Player plug-in. If the user does not have the plug-in, he can't get the content at all. Fortunately for us, the people who do not have the Flash Player represent a very small percentage of Web users.

Another drawback of using Flash has historically been handicapped accessibility. Blind users, for example, may use a screen reader to access a Web page. A screen reader is a computer program that speaks screen text out loud to blind or low-vision users. Although Flash MX content is still not as accessible as plain-text content, Macromedia has added many fantastic accessibility features, which we discuss in Lesson 5.

Let's continue by looking at some example uses of Flash on the Web today.

Advanced Flash use

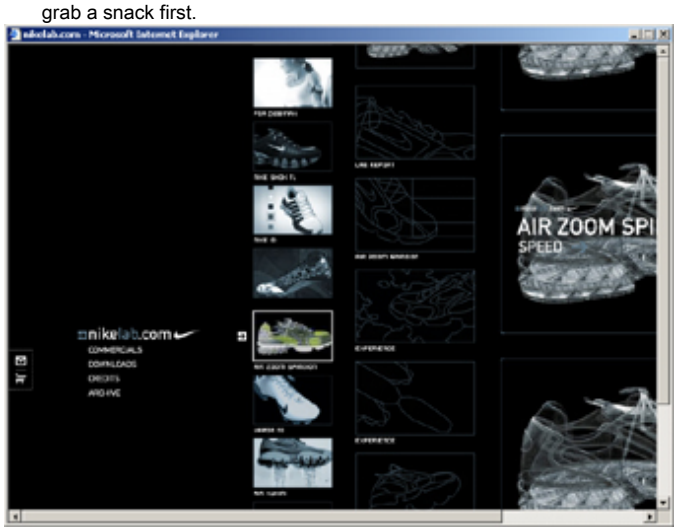
All of the following examples are very advanced uses of Flash and you should not expect to understand them without a large amount of experience and practice using the Flash Authoring Tool. We merely wanted to bring them to your attention so you could see the advanced possibilities Flash

Why are you here?

There's nothing like peer support in a

offers.

- Nike Lab is an interactive experiment by the Nike Shoe Company to build brand awareness and promote the company image to the world. You could easily spend hours on this Web site, so grab a snack first.



- JoshuaDavis.com is developed and maintained mainly as a portfolio Web site for the site's creator. Joshua Davis also used to maintain a Web site named PrayStation, featuring hundreds of interactive art pieces developed in previous versions of Flash.

- The Cartoon Network 's Web site is a perfect example of how vector graphics can be used effectively. The line-art nature of the subject matter (cartoons) allows for delivery of a rich user experience in a relatively low-bandwidth Web site.

Look for other Flash Web sites on your own. Examine them and decide what types of sites you like and dislike. You may even want to post your examples to the Message Board so that everyone can see and discuss them.

Moving on

This lesson covered the basics of Web development, what Flash is, and how Flash fits into the rest of the Internet. In the Lesson 2, you start using the Flash Authoring Tool to create your very own Flash movies.

Be sure to complete the assignment and the quiz for Lesson 1. And please bring your questions, comments, and discussion topics to the Message Board, where you can say hello to your fellow learning environment. If you ever belonged to a study group in school, you'll remember the value of putting heads together to discuss the subject and work through solutions. The Message Board is your online study-group lounge -- a place where you can meet your classmates, share your reasons for signing up for this class, and talk about your goals and dilemmas as you work through this course. You never know who has the answers you seek.

students.

Assignment #1

1. If you haven't already, install Macromedia Flash MX on your computer. You'll need it for the rest of the course exercises and examples. If you're not sure you want to purchase the program, you can download the trial version from Macromedia .
2. Download and install the Flash Player plug-in. Even if you already have the Flash Player plug-in, please install it again. It's always good to have the latest version, and you may need it for some of the examples in this course.
3. Some students may want to download and install multiple standards-compliant Web browsers. This is not required, but most Web developers like to have several. Mozilla , Netscape , Opera , and Internet Explorer are available for both Windows and Macintosh. Safari and Camino are also available for Mac OS X.

Quiz: #1

Question 1:
What's the main objective of the Beginning Flash MX course? (Check all that apply.)

A) ☐ Know the pros and cons of using Flash.
B) ☐ Create your own Flash movies.
C) ☐ Use basic ActionScript for interactivity.
D) ☐ Make Flash content accessible.
E) ☐ Find out where to learn about more advanced Flash authoring.

Question 2:
What's a plug-in?

A) ○ A cable for transferring files from your computer to Internet.
B) ○ A small piece of software that adds functionality to a program.
C) ○ A technique that allows you to plug a picture into a Flash movie or Web site.
D) ○ A program menu for making Flash content accessible to blind and low-vision users.

Question 3:
Which type of image format would be better for a photograph?

A) ○ Raster
B) ○ Vector

Question 4:
What's a Flash Player?

A) ○ An experienced Flash developer, also known as a Flash guru.
B) ○ A software application for creating Flash content.
C) ○ A plug-in for viewing interactive Web content.
D) ○ A Web page that allows you to watch video in Flash.

Question 5:
What does the term cross-browser refer to?

A) ○ A Web page or code that performs well on multiple programs, such as Internet Explorer, AOL, and Netscape Navigator.
B) ○ A Web page or code that performs well on multiple operating systems, such as Windows, Macintosh, and Linux.

Question 6:
What's a screen reader?

A) ○ A news announcer or politician who reads words off a teleprompter in front of a television camera.
B) ○ A computer program that speaks screen text out loud.
C) ○ A friend or coworker who reads screen text to a blind or low-vision computer user.
D) ○ Scrolling text on a Web page that alerts users to news or advertisements.

Learn the Flash interface

This lesson teaches you the basics of the Flash authoring tool. You set up your movie properties, learn the functions of the tools palette, and draw graphics for use in the example movie Face Facts. You learn how to use the timeline, layers, and other panels that you'll often find indispensable.

Explore the Flash workspace

In the Lesson 1 we answered the question, "What is Flash?" Lesson 2 poses a new question, "What can Flash do?" Flash MX has a host of tools and panels that enable you to create, modify, and import content. Luckily, Macromedia has combined these powerful tools into a consistent and easily navigated interface called the workspace, shown in Figure 2-1. Let's explore the workspace and drawing tools first, and then later in the lesson, the fun really begins as you create the graphics for your example movie Face Facts.

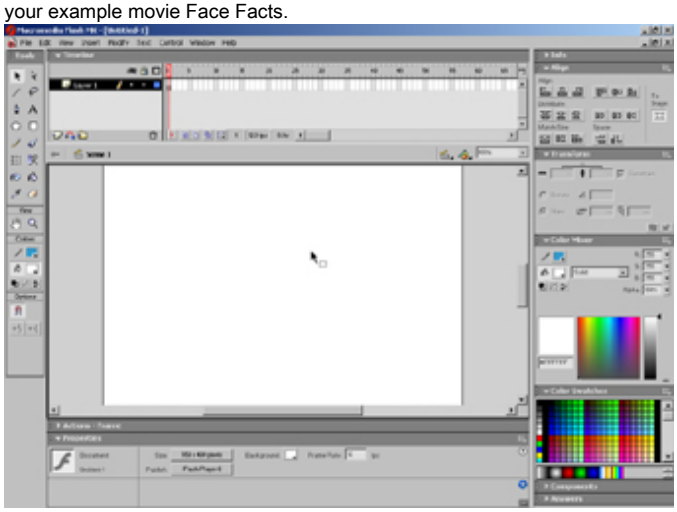


Figure 2-1: The Flash MX workspace.

View a larger version of this image.

Play with Panels of Plenty

If you don't have the Flash program running, start it now. If this is your first time running Flash MX, you'll see the Welcome panel in the center of the screen. This panel leads you step by step through the process of setting up your workspace. Close this panel because this lesson shows you how to set up your workspace.

Flash MX has panel sets for both designers and developers. These panel sets display the tools most used by people working in these roles. Flash also enables you to customize your own panel set. Because this is a beginning Flash course, the Designer panel set best suits your needs. Select Window > Panel Sets > Designer [1024 x 768] .

At the center of the workspace is the Stage . Think of the Stage as your digital canvas, on which you create your Flash masterpieces. The Stage is where you draw and import your graphics.

To the left of the Stage is a group of icons labeled Tools . This is the Toolbox, shown in Figure 2-2. As the name implies, the Toolbox holds the tools you use to create Flash movies. There are four distinct sections in the Toolbox, listed from top to bottom:

- Graphic creation and modification tools
- View navigation tools (pan and zoom)
- Stroke and fill color boxes
- Tool option modifiers

Time for a new system?

If running Flash in addition to your other programs is causing your computer to slow down dramatically, upgrade to an HP business desktop PC, which offers performance and flexibility at an affordable price.

» HP Compaq dc5100 microtower desktop PC

» Desktop buying guide

Figure 2-2: The Toolbox has four sections.

At the top of the Flash workspace is the Timeline, shown in Figure 2-3. The left side of the Timeline lists the layers in your movie. Layers help you organize the many graphics that reside on the Timeline. This list of layers is called the layer stack. The main body of the Timeline shows the frames in your movie. Each frame represents a still image like the frames on a movie reel. This is where the animation magic happens.

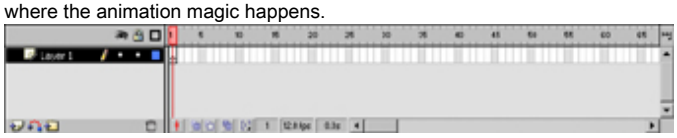


Figure 2-3: The Timeline shows layers and frames.

View a larger version of this image.

The right side of the workspace holds the panels, one of which is shown in Figure 2-4. The panels give you extended options when you're working with your graphics on the Stage, the Timeline, and Actions. Click a panel name to minimize that panel. Click the name again to maximize it. Because there are many panels to work with, this is a good way to gain access to a panel and to get it out of the way when you aren't using it.

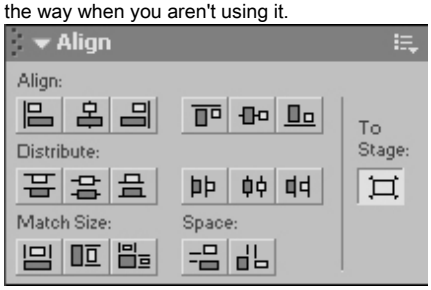


Figure 2-4: The Align panel.

Below the Stage is the Properties Inspector, shown in Figure 2-5, which displays the most frequently used properties for a tool or object. With no tool or object selected, the Properties Inspector displays the settings for the Stage, which include:

- Stage size
- Publishing settings
- Background color
- Frame rate

You'll use the Properties Inspector to modify the Stage and prepare your Face Facts movie.

Figure 2-5: The Properties Inspector.

Set the stage

The size and boundaries of the Stage define the size and boundaries of your final published Flash movie. In the Properties Inspector, click the Size button to open the Document Properties dialog box shown in Figure 2-6. In the Dimensions field, type 550 for the width (the default size) and 500 for the height. You can also set the background color and frame rate in this dialog box. Click the color chip next to Background Color . Your cursor changes to an eyedropper and a color selection grid pops up. Drag your eyedropper over the colors in the selector grid. Notice that the color under your cursor is displayed at the top of the color selector. To the right of the current color is the color's Hex code, which you may recognize if you're familiar with HTML. You can type the Hex code here if you want. For now, click a color chip to pick a new color for the stage. Leave the other settings as they are, and click OK . The Stage has been resized and the background color has changed.

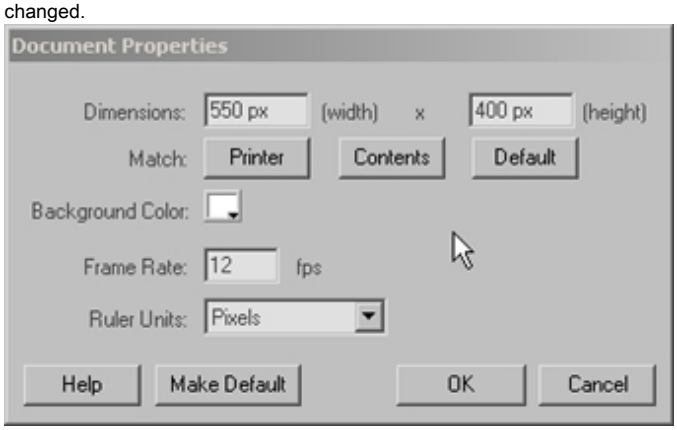


Figure 2-6: The Document Properties dialog box.

Save your file

In just a few steps, you've set the Stage for your first Flash MX movie, Face Facts. Go ahead and save this file by selecting File > Save As . Select the folder where you'd like to save your movie, type faceFacts in the File name field, and press Enter . You should save your file periodically during this lesson as you create Face Facts. To save your work, select File > Save in the top menu or press Control+S (Command+S on the Mac.) Save often while working to ensure that your saved file is always updated. This prevents the loss of work and valuable time in the event of an unexpected power outage, system crash, or a rampaging pet attacking the power cord of your computer.

Click the color chip in the Property Inspector and instead of clicking a color in the selector grid, move your cursor over any region in the Flash workspace. The eyedropper picks up the color of whatever pixel is under your cursor. Click once to select the color. Pretty cool, huh?

Draw a head

Your example movie, Face Facts, consists of a cartoon-like face, drawn and animated by you; some text describing the features of the face and their importance in character animation; and some interactive buttons that enable you to navigate to each facial feature description and animation. You'll get to the animation and interactive scripting in Lessons 3 and 4. First, you must draw a head.

Position your mouse pointer over any tool in the Toolbox. After a moment, the name of the tool displays near your cursor. Take a minute to mouseover each of the tools in the Toolbox and become familiar with their names.

Now click the Oval tool or press the O key on your keyboard. You'll use this tool often. In the Colors section of the Toolbox, click the Fill Color paint chip. As it implies, the Fill Color is the color inside of the shapes you draw in Flash MX. Select a color for your head. Now, click the Stroke Color paint chip. The Stroke Color is the color of the outline around your shape. Select a color for the line surrounding your head shape.

When the Oval tool is selected, the Properties Inspector displays the Oval tool name and its options. Select the different tools in the Toolbox to see how the options in the Properties Inspector change with each new tool you choose. This is the real power of the contextual Properties Inspector. It enables you access to many different properties all in the same location and based on which tool you have active. Select the Oval tool and again and look at the Properties Inspector. You

see color options, Stroke Height, and Stroke Style . Adjust these settings as you wish by selecting a different Stroke Height and Stroke Style.

Now draw the head. Click and drag on the Stage to draw an oval, as shown in Figure 2-7. You just created a head! It may not seem like much now, but you're just getting started.

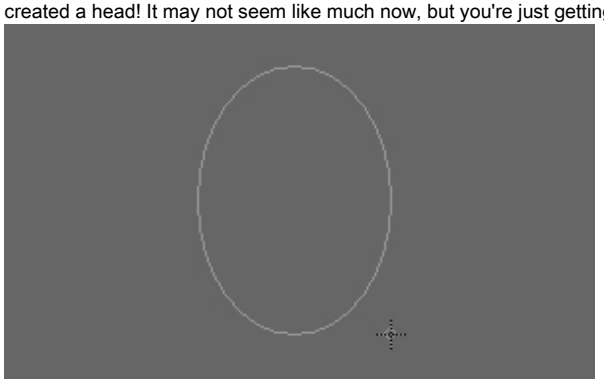


Figure 2-7: Click and drag on the Stage to draw an oval.

Explore shapes

Let's take a minute to look at how Flash renders shapes. Click the Arrow tool in the top-left corner of the Toolbox. Your cursor changes to the Arrow tool. This is the tool that you use to select, modify, and move shapes and other objects in Flash MX. Select your oval by clicking once in its center. Notice how the fill appears grainy but the stroke (outline) does not. This signifies that the fill has been selected. Double-click the shape. Now both the fill and stroke are selected. Click anywhere else on the Stage to deselect the oval. To select only the stroke, click once on the stroke.

You can also drag a selection rectangle, called a Marquee, around your oval to select it. On the Stage, click and drag a Marquee around your oval as shown in Figure 2-8. Click anywhere on the Stage to deselect the oval again.

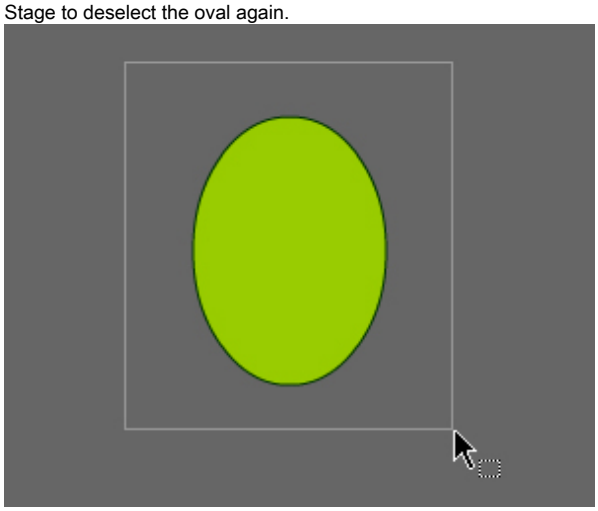


Figure 2-8: Drag a Marquee around your oval.

Move the oval

The Move icon appears next to the Arrow when your cursor is over a selected fill or stroke. Select the stroke, and then click and drag the stroke to a new position where it's partially overlapping the oval fill. Figure 2-9 shows an example.

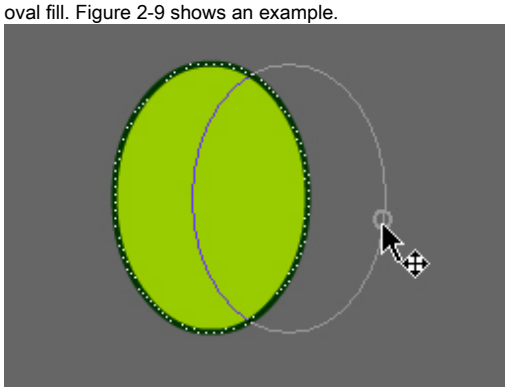


Figure 2-9: Click and drag the stroke to a new position.

Now move your cursor over the fill so that the Move icon appears next to the Arrow tool. Click and drag the fill. Wow! The stroke has bisected your fill and you've moved only a piece of the fill to a new position, as shown in Figure 2-10. This method of drawing is unique to Flash and enables you to easily create complex shapes by chopping up simple ovals, rectangles, and polygons. You can also use the Marquee to select portions of the oval. Only the portions that fall within the Marquee will be

selected. It appears you have a somewhat mutilated head on your hands now. Repeatedly click Edit > Undo or press Control+Z (Command+Z on the Mac) to Undo until you're back to the original oval head shape.

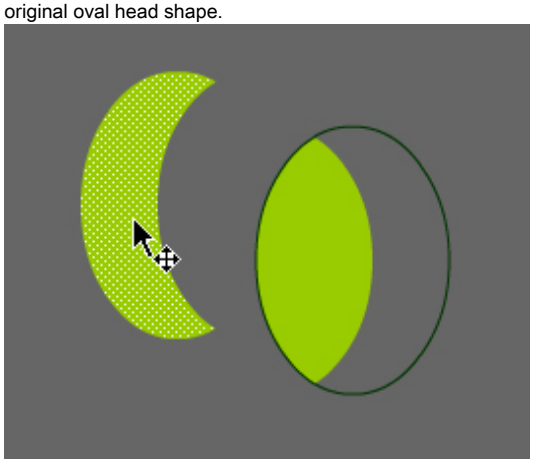


Figure 2-10: Move a piece of the fill.

Snap to objects

Select the Arrow tool. In the Options section at the bottom of the Toolbox, look for a horseshoe magnet icon called the Snap to Objects icon and make sure that it is toggled. The Snap to Objects modifier allows you to accurately move and place objects in relation to other objects on the Stage. Flash will signify that you are snapped to another object by placing a small outlined circle either near the cursor or at the end of the line that you are drawing. Click and drag with the Oval tool and draw another oval near the first but don't release the mouse button. As you are dragging the cursor near the first oval, the cursor will snap to that oval's outline. See Figure 2-11. Drag the cursor around and experiment with the Snap to Objects function. When you are finished, click Edit > Undo in the top menu or press Control+Z (Command+Z on the Mac) until you are left with only the head oval.

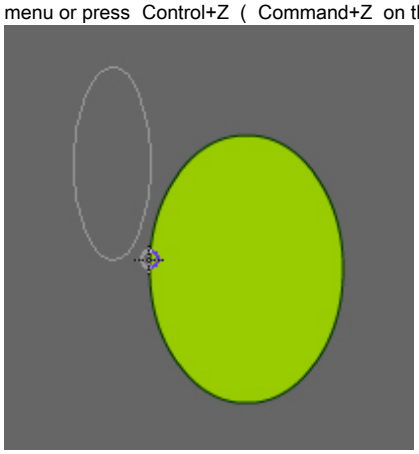


Figure 2-11: This image shows the cursor snapped to the outline of the oval.

Try the Free Transform Tool

Select both the oval fill and stroke by double-clicking the oval. In the Toolbox, select the Free Transform Tool or press the Q key on your keyboard. A transform box appears around the oval on the Stage. The box has handles, which are small boxes, on its corners and sides. Move your mouse over any of the small boxes in the corners or center of each side. The icon showing a line with arrows on each end, shown in Figure 2-12, represents the Scale transform.

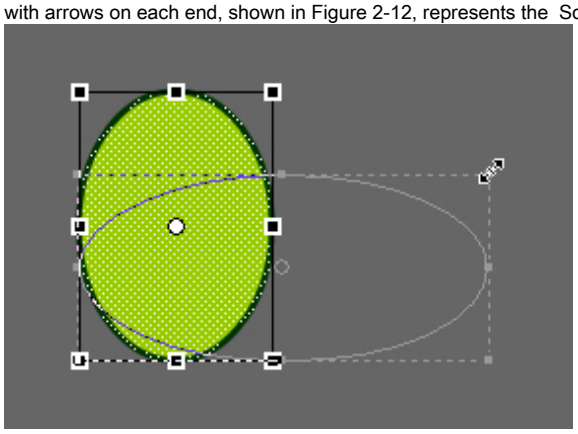


Figure 2-12: Transform the scale of the oval.

Move your mouse just outside one of the corners. A circular arrow icon appears. It's the Rotation transform. Now move your mouse over any of the sides, but not on the scale boxes. The icon showing two arrows, one on top of the other, is the Skew transform. Experiment by clicking and

dragging the different transform icons. Try out each of the transforms to see how it behaves. Adjust the oval until it is the size and shape you want for your face.

Use groups

At times you need to be able to select and move shapes as discreet objects without having them erode each other in the manner discussed earlier. Other times, you may want to treat several shapes as one entity. To do this, use the Group command. Select both the fill and stroke of your oval. Choose Modify > Group or press Control+G (Command+G on the Mac). This transforms your oval into a group. When you select the oval, the Properties Inspector displays group as the object type. Double-click the oval to edit it. Just above the Stage you'll see a scene clacker icon with the underlined phrase Scene 1 and the group icon with the word Group . This tells you that you're within the group and can edit its shapes. Click the underlined Scene 1 or double-click an empty area of the Stage to return to the Stage. To ungroup shapes, select the group, and then select Modify > Ungroup or press Control+Shift+G (Command+Shift+G on the Mac).

Keyboard shortcuts are quick keystrokes that you can use to execute the commands found in Flash MX. These shortcuts make your workflow faster. As you become more familiar with Flash, you'll pick up shortcuts that work best for your particular style of work. Keyboard shortcuts are listed beside their corresponding commands in the menus and appear as tool tips when you mouseover tools in the Toolbox.

Organize with Layers

When creating your Flash movies, you'll sometimes have many groups and shapes on the stage at a time; layers help you organize them. In Face Facts, you'll have separate features that make up your face. Each facial feature will reside on its own layer. As mentioned earlier, the layer stack sits to the left of the Timeline above the Stage. You currently have one layer entitled Layer 1.

Create and modify Layers

Double-click the layer name. It becomes active and you can edit the layer name. In the active text field, type head to rename the layer. There are four icons at the bottom of the layer stack. From left to right they are

- Insert Layer
- Add Motion Guide
- Insert Layer Folder
- Delete Layer

Insert a new Layer

Click the Insert Layer icon to add a new layer. A new layer, named Layer 2, appears above the head layer, as shown. in Figure 2-13. New layers you insert with the Insert Layer icon appear above the currently selected layer. Rename this new layer ears. Your ears layer is selected and displays a pencil icon next to its name. Any new shapes that you draw are drawn on this layer until you select a different layer. You can select different layers by clicking once on their layer names.

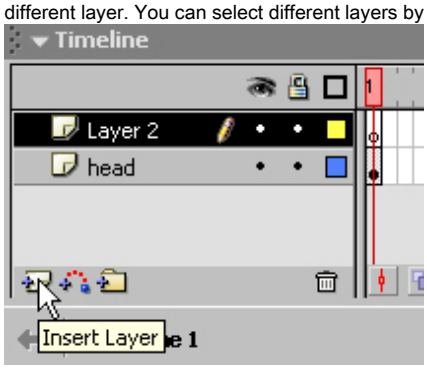


Figure 2-13: Add a new layer.

Change the Layer stack order

Make an ear by selecting the Oval tool and drawing another oval. This oval appears above the head shape because the ears layer is above the head layer in the layer stack. Click and drag the ears layer to below the head layer. Now the ear is behind the head and looks a little better.

Create a new layer and name it eyes. Move the eyes layer above the head layer. Draw an eye on the eyes layer by making a white circle with a black stroke.

Hide, lock, and outline Layers

Another advantage of using layers is the capability to hide or lock a layer that you're not currently editing. You can also view a layer or all layers as outlines, which helps you see details that might be hidden beneath a fill. There are three icons at the upper-right side of the layer stack that enable you to manipulate layers:

- Eye (Show/Hide All Layers)
- Lock (Lock/Unlock All Layers)
- Box Outline (Show All Layers as Outlines)

Click the Eye icon at the top of the layer stack. All layers are now hidden. Click the Eye again and all layers are shown. Each layer has a dot that corresponds to the Eye icon at the top of the stack. To hide the head layer, click the dot beside that layer and below the Eye icon. The head layer is now hidden and a red X has appeared in place of the dot. Click the red X to show the head layer.

Try clicking the other dots in the layer stack to see how they respond. Objects on a locked layer cannot be modified, and new objects cannot be created on that layer while the layer is locked. Simply unlock the layer to begin editing again. When a layer is in outlines mode, you can select the stroke of a shape but not the fill. Now, return all layers to the unlocked, shown, and nonoutlined positions, and fasten your seatbelt. You're moving on.

Duplicate the eyes and ears

You now have a head with one eye and one ear. Your face needs one more of each feature unless you're drawing an otherworldly, alien face. You could do that easily if you wanted, but for this example let's stick to a vaguely humanoid face. Faces are generally symmetrical. You could draw two different ears and two different eyes with the Oval tool, but it might be tedious to get them both exactly the same. To create identical features for each side of the head, you can draw only one and then duplicate it for the other side.

Using the Arrow tool, select the ear oval (double-click). Press Control+C (Command+C on the Mac) to copy it and Control+V (Command+V on the Mac) to paste the new ear onto the Stage. You may not be able to see the new ear you just created, so hide the head layer by clicking its dot in the Eye icon column. Go ahead and hide the eyes layer as well. Now you should only see the original ear and the one you just pasted onto the Stage. Copying and pasting is the simplest way to duplicate shapes on the Stage. You'll learn a more advanced method in Lesson 3.

With the Arrow tool, select your new ear and delete it by pressing the Delete key. Show the head layer by clicking the red X in the Show/Hide column of the layer stack. This will give you a reference for the position of the new ear. Make sure that the Snap to Objects button in the Toolbox is toggled on. Select the original ear. Now, while holding the Alt key, click and drag the ear to the left or right depending on which ear you're missing. While the holding the mouse button, you should see a plus sign below the cursor to indicate duplication, as shown in Figure 2-14. If you drag directly to the right or left, the Snap to Object circle icon appears and the object outline snaps in alignment with the original. Release the mouse button when you've positioned the ear where you want it. You've duplicated the ear and the new ear should be directly aligned with the original. Alt-dragging enables you to quickly copy objects on the Stage.

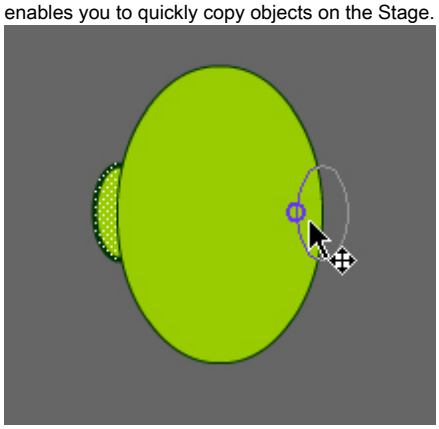


Figure 2-14: Alt-drag to duplicate the ear.

Now, show the eyes layer by clicking the red X in the Show/Hide column. Repeat the Alt-drag process to duplicate the eye.

Finish the eyes

Eyes look strange without some detail. Create a layer called pupils and use the Oval tool to draw two smaller ovals within the eyes to represent the pupils of the eyes, as shown in Figure 2-15. Draw your pupils without strokes around them. You can accomplish this in two ways. You could draw the ovals, select only the strokes, and then delete them. Or you can select the Oval tool, and, in the Properties Inspector or Toolbox options, click the Stroke Color chip. At the top of the Color Selector, select the white box with a red diagonal line through it. This is the No Color selection. Then draw the pupils. You can use the No Color selection for fills as well.

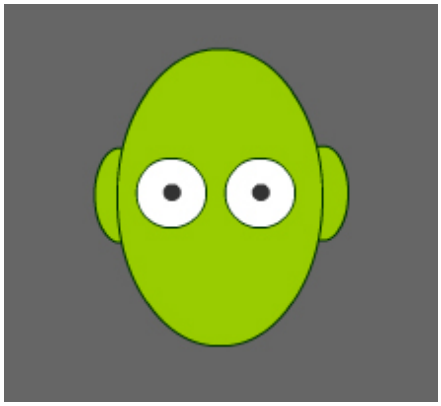


Figure 2-15: Add two ovals without strokes for the pupils.

Draw the mouth and hair

Thus far you've drawn most of your facial features with the Oval tool. Now you'll explore a few other tools to complete your face. Create a new layer named mouth, and another one named hair. Drag both layers and place them above the head layer in the layer stack. Select the mouth layer.

Use the Line tool

Select the Line tool from the Toolbox. Draw a horizontal line where you want the mouth to be. Select the Arrow tool and position it over the middle of the line you just drew. Notice the curved line icon beneath the Arrow tool. Position the Arrow tool over one of the ends of the line, and you should see a corner icon beneath the Arrow tool. Experiment with the Arrow tool by clicking and dragging the middle of the line. As you drag, the straight line becomes curved and you can adjust the curve up or down as well as side-to-side. Click and drag one of the ends of the line to adjust the end point of the line. This is a smooth way to adjust any shape that you draw. You can modify fill shapes in the same manner.

Adjust your line so that it looks like the bottom of a basic smile. Select the Line tool again. Draw a line between the ends (corners) of your smile. Using the Arrow tool, drag this line down as well to complete the mouth shape. You should now have a smiling crescent-shaped mouth, like the one shown in Figure 2-16.

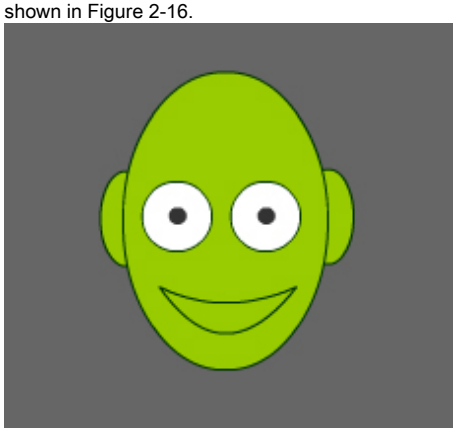


Figure 2-16: Adjust the two lines to form a crescent shaped mouth. Your face is smiling.

Use the Ink Bottle tool

You may have selected the color for your mouth before you drew your lines. To change the stroke color of a shape that's already drawn, use the Ink Bottle tool. Select the Ink Bottle tool from the Toolbox. Select a new stroke color for the lines of the mouth. Now click the lines of the mouth with the Ink Bottle tool. The stroke color changes to the new color.

You can use the Ink Bottle tool to change the stroke color of the other features in your face. Remember that if your shapes are in a group, you need to double-click the group until you can edit the shapes with it.

Use the Paint Bucket tool

Your mouth should look pretty good now but it needs a fill color. Select the Paint Bucket tool from the Toolbox. Select a fill color and click inside the mouth shape. The mouth fills with the color you selected.

Use the Paint Bucket tool to change the fill color on the other features of your face as you see fit.

Visual clarity

Your monitor is not just a tool, it's a creative partner that brings your ideas to life, giving them shape, clarity, and color. The monitor you choose makes a tremendous difference to the way you work and to the results of your work.

» HP Flat panel monitor L2335

Use the Pencil tool

Now draw the hair. Select the hair layer in the layer stack. Select the Pencil tool from the Toolbox. The Pencil tool has three different modes in the Options section of the Toolbox:

- Straighten
- Smooth
- Ink

Click the Pencil Mode button and select one of the modes from the drop-down list. Experiment with the three different modes and draw hair for the head. Try using different stroke heights and styles to achieve various hairstyles. You can draw many strands of hair, or draw filled shapes as shown in Figure 2-17.

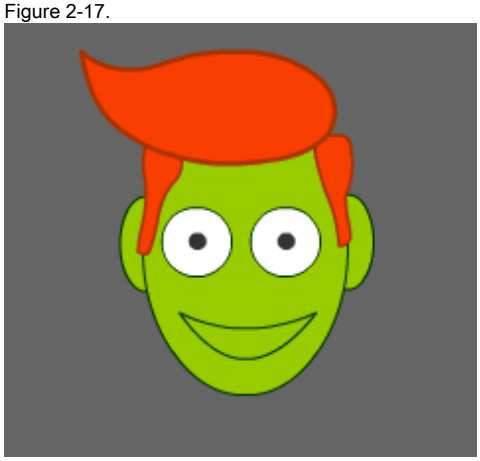


Figure 2-17: Three filled shapes can represent the hair.

Get perfect alignment

The Align panel to the right of the Stage is an indispensable tool for arranging objects on the stage. Position your mouse over each button in the Align panel to see a description. Try selecting each eye oval, and then pressing the Align Bottom Edge button. Select the eyes. Select Modify > Group to group the eyes. Hold down the Shift key, and select the head shape. Shift+selecting is the method you use to select multiple objects as once. Now the head and both eyes are selected. Press the Align Horizontal Center button. The eyes symmetrically align with the center of the head, as shown in Figure 2-18. Use the same process to get all of your features aligned as you want them.

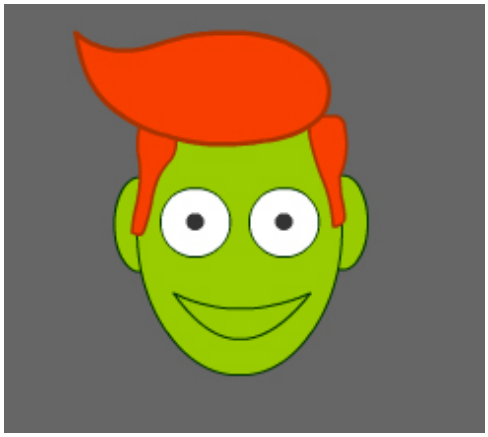


Figure 2-18: Align the eyes to the center of the head.

Add finishing touches

You have a fairly complete face at this point. You can add other features and change colors as you see fit. I added a simple nose on its own layer using an unfilled oval. I then selected the top half of the nose with the Marquee and deleted it. That complete face is shown in Figure 2-19.

Figure 2-19: Here's a face with a nose and final adjustments made to stroke color, alignment, and scale.

Moving on

You have now explored many of the drawing and editing tools in Flash MX. You created a face for the character in your project, Face Facts. In Lesson 3, you'll animate the face to give it a little life and expression. Be sure to do the assignment and test yourself with the quiz for this lesson before moving on. Also, visit the Message Board to find out what your fellow students are up to.

Assignment #1

Now that you've learned a few of the tools in Flash MX, use your new skills to practice drawing. Flash MX enables to you create graphics in many styles, from cartoon and lighthearted to elegant and subtle.

Visit one of my favorite Web sites, Home Star Runner , to see great Flash cartoons.

Quiz: #1

Question 1:
What's the Flash interface in which you work called?

A) Workshop
B) Workbench
C) Stage
D) Workspace

Question 2:
What resides, by default, at the center of the Flash interface and could be considered your digital canvas?

A) Timeline
B) Toolbox
C) Stage
D) Flash Player

Question 3:
True or False: The left side of the Stage contains the list of Layers in the Flash movie.

A) True
B) False

Question 4:
True or False: The Stroke Style controls the color of the lines in a shape.

A) True
B) False

Question 5:
True or False: The main body of the Timeline is made up of little rectangles called Cellboxes.

A) True
B) False

Question 6:

What holds the many Tools you use to create graphics in Flash?

A) Lunchbox

B) Toolchest

C) Toolbox

D) Toolset

Animate the face

In this lesson, you learn the terms and methods used in the Flash animation process. You then apply what you've learned to the Face Facts project and animate the face you drew in Lesson 2.

The timeline revisited

In Lesson 2, you created your first vector graphic, a face, using the Flash drawing tools. In this lesson, you animate the face and bring it to life using the Timeline, as shown here.

If you don't have it open, start Flash MX and open your Face Facts file.

Explore Frames

As the name implies, the Timeline helps you edit the timing of your animation in Flash. The Timeline is laid out as a grid of cells called frames extending from left to right beside each layer. Look at the top of the Timeline. Frames are numbered beginning with 1, your starting frame, at the far left of the Timeline grid, at the edge of the layer stack. Frame 1 should be highlighted in red at the top of the Timeline. The red line running vertically through frame 1 and the red rectangle above is called the playhead. The playhead marks the current frame being displayed on the Stage. For layers that contain graphics, there's a filled circle in frame 1. A gray shaded frame with a filled circle inside is called a keyframe. Flash creates a keyframe on frame 1 the first time you draw graphics on a layer.

At the bottom of the Timeline are three text fields showing information about the Timeline. The first shows the current frame on which in the playhead resides. The second shows the FPS (frames per second) of the Flash movie. The third gives you the elapsed time in seconds for the position of the playhead.

A brief history of keyframes and tweens

The term keyframe has its roots in traditional hand-drawn animation. Lead animators would draw a series of images that roughed out the animation. These were the key frames. Junior animators would then draw in the images between the key frames; their images were called the in-betweens, later shortened to just tweens. Animating in Flash is similar to traditional animation. You create keyframes for the animation of your face, and Flash fills in the tweens for you, making your animation task much easier. Flash uses two tween types:

- Shape: These tweens are useful when you want to morph shapes into other shapes. You'll use the shape tween to animate your face's mouth.
- Motion: These tweens can only be used with symbols. You'll use the motion tween to animate the eyes and hair of your face.

Explore symbols, instances, and the Library

Symbols are a very important aspect of Flash. After you convert a graphic into a symbol, it's stored in the Library. To view the Library, select Window > Library from the top menu or press F11 on your keyboard. Since you have yet to create symbols, your Library should be empty.

You bring instances of symbols into your Flash movie by dragging them onto the Stage. An instance is a copy of a symbol. For example, you want to animate a group of ducks walking across a street. You draw just one duck on the Stage; convert it to a symbol named Duck, and then drag instances of Duck onto the Stage. All the ducks on the stage will be instances of your Duck symbol in the library. Now, if you want to modify the appearance of the ducks in the group, you edit the Duck symbol in the Library and all instances of Duck on the Stage reflect your changes.

Symbols give you another advantage. When you publish your movie to the Internet, the Duck symbol is exported only once. Flash copies the Duck symbol to the instances that you created when it plays in the user's browser, thus shortening download time.

Converting a graphic to a symbol enables you to use a motion tween to animate certain properties of the symbol, such as height, width, scale, and position on the screen.

Examine types of symbols

Symbols have their own unique layers, Timelines, and Stages. There are three types of symbols in Flash:

- Graphic symbols are best used for still images or for reusable animations that are tied to the main Timeline. They aren't used for complex interactivity or sound effects.
- Button symbols are used to create interactive buttons that respond to the user's mouse. When used with ActionScript, buttons can create complex and interesting interaction for the user.
- Movie Clip symbols are possibly the most used of symbols in complex Flash projects. A Movie Clip has its own Timeline that plays independent of the main Timeline. Movie Clips are used to create reusable animation sequences, can contain complex scripting for advanced interactivity, and can also contain other Graphic, Button, or Movie Clip symbols.

Prepare your graphics for animation

It's good practice -- and usually absolutely necessary -- to have a separate layer in the Timeline for each symbol or shape that you are animating. Animating two separate symbols on the same layer in the Timeline has unpredictable results. So the rule to follow is: Place each symbol on its own layer. Follow this practice and you'll enjoy a reliable animation process.

At the end of this lesson, your Face Facts movie will consist of separate animations for the eyes, mouth, and hair. In Lesson 4, you'll add interactivity to the movie, enabling the user to click on buttons labeled Eyes, Mouth, and Hair, which will cue the animation for that specific feature. You'll also add text that describes each facial feature as it is animating. You need to adjust the layout of your movie to accommodate the buttons and text. Using the Arrow tool, drag a Marquee around the entire face, making sure that every shape is selected. Click and drag the whole face and move it to the top and center of the Stage. You may need to use the Free Transform tool to scale the face as needed to allow enough room at the bottom. Figure 3-1 shows how the layout should look.

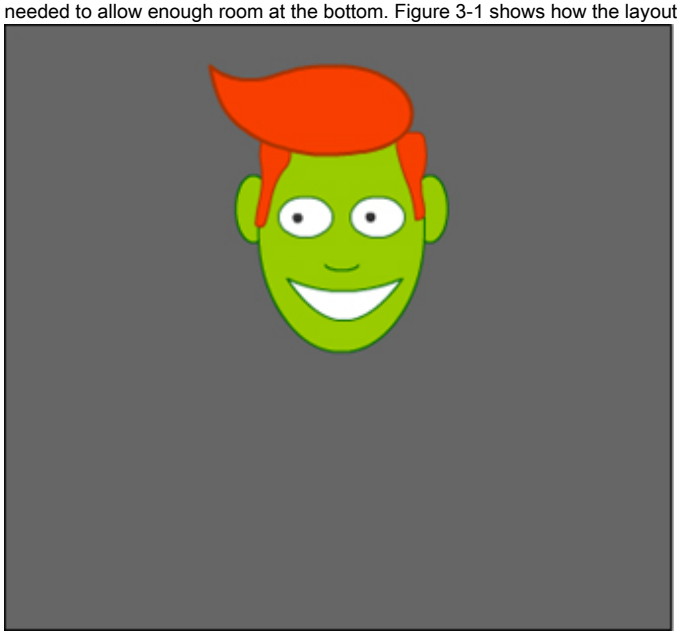


Figure 3-1: Position your face near the top center of the Stage.

Create a symbol for the eyes

You're going to animate the whites of the eyes together as one element. It may seem as if you're already breaking our rule (one symbol per layer), but you aren't. You can have as many groups and shapes in one symbol as you want. If you wanted to animate the whites of the eyes separately, as you would if your face were winking one eye, you'd create a symbol of one eye and place instances of the eye on two separate layers. You'll use a similar approach when you animate the pupils.

Select the eyes in the eyes layer. Select Insert > Convert to Symbol, or press F8. In the Convert to Symbol dialog box, type eyes in the Name field as shown in Figure 3-2. In the Behavior section, select Graphic. Click OK. The selection on the Stage is now an instance of the eyes Symbol.

Incorporating photos

Use scanned images to personalize your Flash animation. HP's high performance scanners allow for fast scans of up to legal size documents.

» HP Scanjet 7650 document flatbed scanner series

» Scanner buying guide

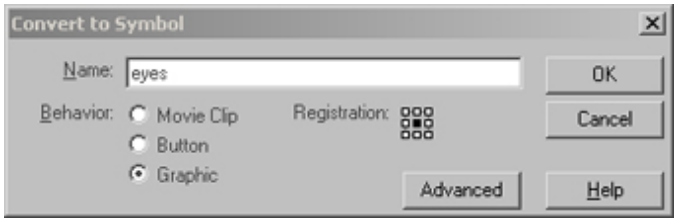


Figure 3-2: Name the symbol eyes.

If your Library is not open, open it now by pressing F11. You should see your newly created symbol in the Library list. To see a preview of your symbol, select the symbol in the Library. The preview appears at the top of the Library.

Explore the Library

The Library window give you access to information about the symbols used in your movie. The list of symbols shows you:

- Name
- Kind (Movie Clip, Button, or Graphic)
- Use Count (number of instances of a symbol in your movie)
- Linkage (not covered in this course)
- Date Modified

On the right side of the Library window are two buttons for controlling the view of the Library, as shown in Figure 3-3. Click each one to change the Library view.

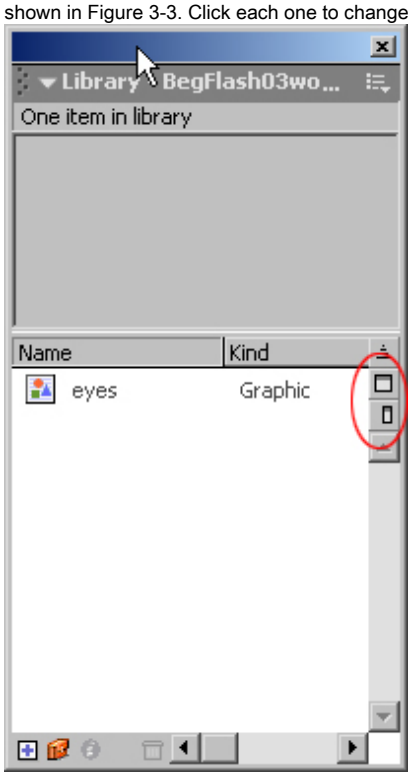


Figure 3-3: These buttons control the view of the Library.

Click and drag an instance of eyes onto the Stage. This is another method to use to add instances of symbols to the Stage. Delete the instance of eyes you just created. You're now left with the original instance of eyes.

Create a symbol for the pupils

You're going to animate the pupils separately. Select and delete the pupil on the right side of the face. Select the left pupil. Another method you can use to create a symbol is by using mouse to open a drop-down menu on the Stage. Right-click (Command+click on the Mac) the selected pupil. A drop-down menu appears. Select Convert to Symbol from the menu. Name this symbol pupil and set its Behavior to Graphic.

In the layer stack, rename the pupil layer to pupil left. Now create a layer for the right pupil and name it appropriately. Select pupil right layer in the layer stack and then drag an instance of pupil onto the Stage. Position the new pupil instance over the eye. Align as needed to get the positioning right. You have two layers, one for each pupil, with a separate instance of pupil on each layer, and can animate the pupils independently.

Create a symbol for the hair

Select one or all of the shapes that you drew for the hair. Convert the shape(s) to a symbol using one of the methods you've learned. Name the symbol hair and set its Behavior to Graphic. We chose to convert only the top portion of the hair to a symbol and put it on its own layer, as shown in Figure 3-4.

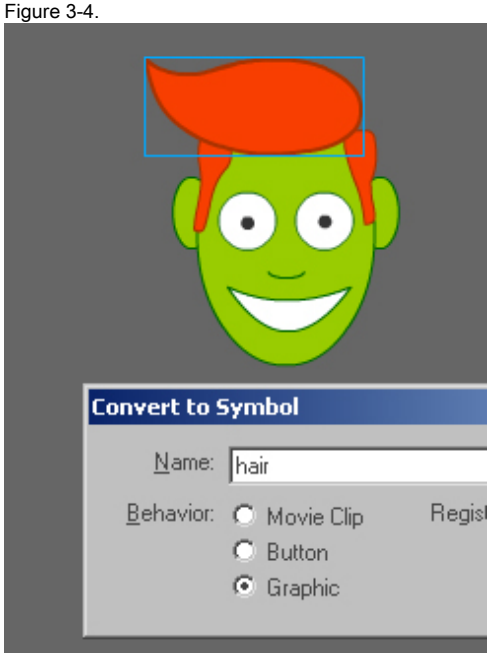


Figure 3-4: We converted only the top hair shape into a symbol.

You can create something similar with your character's hair. Just remember to put each symbol that you intend to animate on its own layer.

Animate the eyes and pupils

Animating in Flash MX consists of adding keyframes and then adjusting the properties of your symbols, such as position, scale, and rotation. You then add additional tween frames to adjust the timing of the animation. You'll start by animating the eyes symbol.

Insert a keyframe in the eyes layer

In the eyes layer, select frame 10. The frame is highlighted. Right-click (Control+click on a Mac) the frame and select Insert Keyframe in the drop-down menu. The frame becomes shaded and contains a filled circle. The playhead, the red vertical line, is now on frame 10 and you should see the eyes symbol on the Stage while everything else seems to have disappeared. All other frame cells on the other layers for frame 10 are empty, thus you won't see graphics.

You can also add keyframes by selecting Insert > Keyframe from the top menu or by pressing F6 on your keyboard. The right-click drop-down menu is easy and convenient, so we use it often.

Select the eyes symbol on the Stage. Expand the Transform panel if it's not expanded. The Transform panel enables you to input numerical data to transform objects on the Stage. Deselect the checkbox named Constrain. In the Height field, type 45%, and press Enter. The eyes should now appear narrowed as if squinting. Right-click on keyframe 1 and in the drop-down menu, select Create Motion Tween. The tween frames turns a pale purple color and there is an arrow from keyframe 1 to keyframe 10. Press Enter to preview the motion tween you just created.

Click and drag the playhead left and right. This action is called scrubbing. It enables you to play through the frames to better analyze you animations. Scrubbing is a very useful process. Scrub through the animation of the eyes now to see them animate.

Insert keyframes in the two pupil layers

At frame 10, insert keyframes for both pupil left and pupil right layers. Making sure that the playhead is at frame 10, select and then move one of the pupils to the left corner of its eye. Make sure the pupil is still selected. In the Transform panel, select the Constrain checkbox. This sets both Height and Width scale factors to be equal. In either Height or Width field, type 60% to scale the pupil. Repeat the process for the other pupil. Create motion tweens for both pupils at frame 1, using the right-click method you learned earlier. Now both pupil left and pupil right layers are shaded purple and show the arrow through the tween frames.

Scrub the animation to see the results. You should see the pupils shrink and move to the left within the eyes, making the eyes appear to look left. The eyes should also narrow, giving an impression of suspicion or contemplation.

Scrubbing tip

Sometimes while scrubbing, you'll notice that symbols on certain frames have remained selected. This can be distracting at times. There is an easy fix. Scrub through the animation, and when you see a selected symbol, click anywhere on the Stage to deselect it. Repeat this process for any area of the animation you want to scrub and not see selected symbols.

Add frames to show the entire face

It would be nice to see the animation of the eyes in context with the other parts of the face. Sometimes it's necessary to see other parts of your animation to make the next decision for a keyframe or tween. To add frames to a layer, select the frame cell in the layer in which you want to add frames and select Insert > Frame in the top menu, or press F5. To add frames to multiple layers at once, Shift+click the frame cells in the layer in which you want to add frames, and then select Insert > Frame. If you can't see all the layers in the stack at once, click and drag the bottom edge of the Timeline down to expand the Timeline view.

Add frames in all layers of the face now. Shift+click the frame cells in all the layers at frame 30. See the Timeline in Figure 3-5.

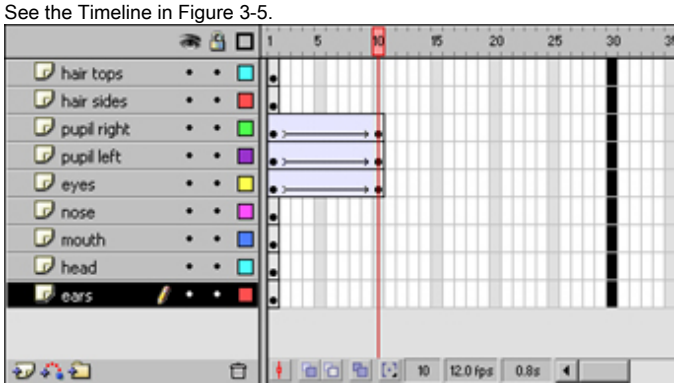


Figure 3-5: Shift+click the frame cells to select multiple frames.

View a larger version of this image.

In the top menu, select Insert > Frame or press F5. Flash fills in frames from the last keyframe or tween frame up to the frame that you selected. These frames will be shaded gray like the keyframe before it. The last frame in the sequence of added frames will contain a hollow box. This signifies that the keyframe at the start of the sequence should repeat for all of the shaded frames until the hollow box frame is reached. This allows you to maintain the state of a keyframe through the timeline without having to insert a keyframe for every frame. Figure 3-6 shows the Timeline with frames added to all layers up to frame 30.

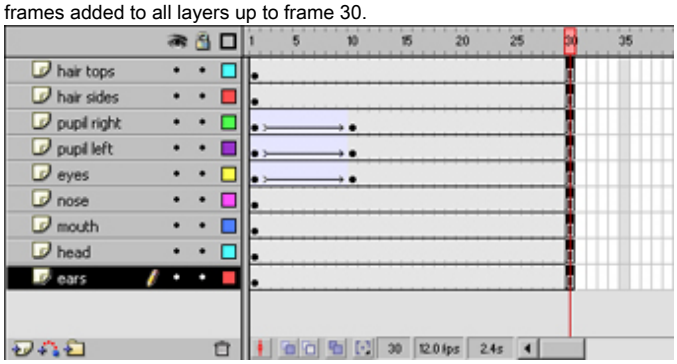


Figure 3-6: All layers have frames up to frame 30 in the Timeline.

View a larger version of this image.

Scrub through your animation of the eyes now. Seeing the whole face during the animation helps you to better analyze your work and gives you a better picture of the direction your animation is taking.

There are two other methods for selecting the frames that you want to edit. You can click and drag in an empty frame cell to select frames on adjacent layers in the stack. You can also Control+click (Command+click on the Mac) individual frames on layers that are not adjacent.

Complete the animation for the eyes and pupils

Insert a keyframe at frame 20 for both pupils. Select one of the pupils at frame 20 and move it to the opposite corner of the eye. Repeat the process for the other pupil. Don't add a motion tween here because what you want is for the pupils to move immediately, giving the impression that the eyes are rapidly looking in the opposite direction.

Insert a keyframe at frame 30 for the eyes. Select the eyes. In the Transform panel, change the Height scale transform back to 100%. This returns the eyes to the open state. Once again don't use a motion tween -- you want the eyes to pop open.

Copy frames

In Flash, you can copy and paste frames to other positions on the Timeline. You generally use this method when you want to replicate the state of one keyframe to another, or to move many frames from one layer to another.

Right-click keyframe 1 in the pupil left layer and in the drop-down menu, select Copy Frames. Now Right+click keyframe 30 in the pupil left layer. In the drop-down menu, select Paste Frames. Right+click keyframe 30 again and select Remove Tween. This removes the motion tween that was copied from frame 1, because it isn't needed at frame 30. Repeat this process for the other pupil. Scrub the animation to see the results. The pupils and the eyes all return to the state as seen in frame 1. You'll use this same technique at the end of every face animation to create a consistent starting expression for the face at the beginning and end of each animation.

Why keyframes every 10 frames?

You may be wondering why you placed all the keyframes at increments of 10. Building an animation is easier if you rough in the keyframes first. Placing keyframes at increments of five or ten is merely a convenience. You'll rough in the animation for all the facial features in this manner. Later in the lesson, you'll learn to add and remove frames as necessary to adjust the timing of the animation.

Animate the mouth

The mouth animation starts where the eyes left off, at frame 30.

Use a shape tween rather than a motion tween for the mouth. Shape tweens only work for shapes on the Timeline on which the shape tween is applied, and thus the reason you didn't create a symbol for the mouth. You can create shape tweens on other Timelines, inside of a Movie Clip symbol for instance, but you won't do so for this exercise.

Add more frames

This time around, you're going to add the frames for the entire segment first, and then build up the animation with keyframes. Click and drag to select all the frame cells at frame 60, for all layers. You may need to use the scroll bar at the bottom of the Timeline to scroll to frame 60. Press F5 and add frames to all layers. This process is similar to that shown in Figures 3-5 and 3-6 earlier in this lesson.

Insert a keyframe in the mouth layer at frame 30. This gives you a starting mouth position keyframe from which to animate the mouth. Insert another keyframe at frame 35. Edit the mouth shape on frame 35. Select the Arrow tool from the Toolbox and reshape the mouth by clicking and dragging the points of the lines and the lines themselves. Recall from Lesson 2 that the cursor indicates what you are editing when you mouseover the shape. Make whatever expression you'd like. We created a mouth shape that seems to express confusion, as shown in Figure 3-7.

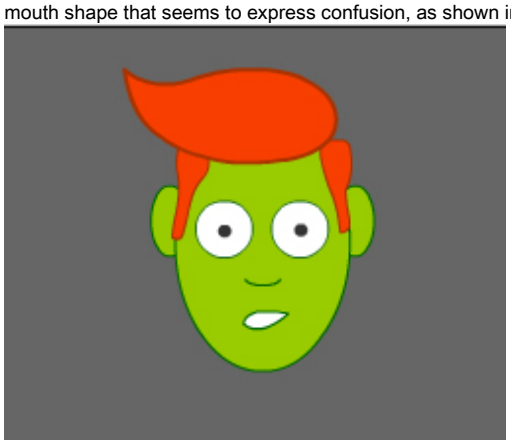


Figure 3-7: The mouth has been reshaped to give the impression of confusion.

Making sure that keyframe 30 in the mouth layer is selected, open the Properties Inspector, which has a frame icon on the far left. Find the drop-down menu labeled Tween, and select Shape from the menu. Now frames 30-35 are shaded green and show an arrow through the tween portion, similar to the motion tweens that you created previously. Scrub through the frames to see the animated mouth. Shape tweens are very useful for animating organic shapes.

Insert a keyframe at frame 45. Again using the Arrow tool, create another expression for the mouth. We made the mouth appear closed with the corners slightly down-turned. You won't use a shape tween here; instead, the mouth switches immediately to the new expression on frame 45.

Insert a keyframe at frame 55. This is the starting keyframe for the return to the expression in frame 30. Insert a keyframe at frame 60. Copy and paste keyframe 30 to keyframe 60 using the right+click method you learned earlier in the lesson. Remove the tween from keyframe 60. Select

Printing frames

Printing the individual frames of your animation, either for your own review or to go over with other animators, coworkers, or clients, will allow you to make notes about details you want to tweak in Flash.

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» Printer and MFP buying guide

keyframe 55 and in the Properties Inspector set the Tween to Shape. You now have a mouth that animates through two expressions and returns to the starting expression.

Animate the hair

You're nearing the end of the animation work for Face Facts. The last step you need to complete is to animate the hair. Thus far, you've learned to animate a symbol's position and scale using a motion tween, and to morph a shape into another shape using a shape tween. Now you'll learn to animate a symbol's Color properties. For this you'll again use the motion tween.

Download the source

Download this zip source file and unzip the contents to see the techniques in this lesson at work.

Understand the Alpha color property

Select frame 90 in all layers and press F5. This adds the additional 30 frames needed for the hair animation. Insert a keyframe at frame 60 in the hair layer. This is the starting keyframe for the hair animation. Insert a keyframe at frame 70.

On the Stage, select the hair symbol. Open the Properties Inspector, which shows the Graphic icon on the far left side. Find the drop-down menu labeled Color at the right side of the Properties Inspector. Select Alpha from the drop-down menu. The term Alpha refers to a symbol's Alpha channel. The Alpha channel is the percentage of a symbol's opacity. By animating the Alpha property, you can create interesting effects, the most basic of which is a fade. You can fade in or fade out a symbol. To the right of the Color drop-down is the percentage slider. Type 0% in the input field or use the slide to set the Alpha to zero percent. The hair symbol now has an opacity of zero percent and is completely transparent.

Even though you cannot see the hair symbol, it's still there. Click the Stage to deselect the hair and then click the area where the hair is. Notice that the selection box still appears around the hair symbol, as shown in Figure 3-8.

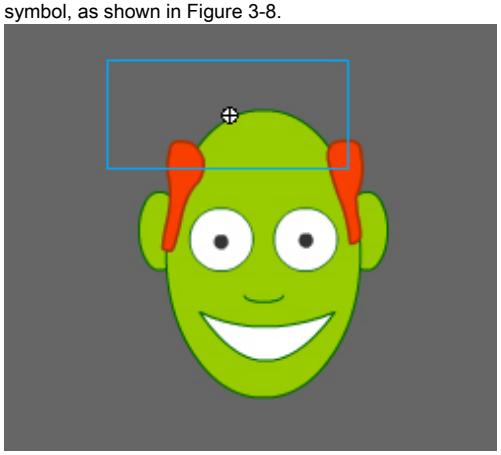

Figure 3-8: The selection box still appears around the hair symbol, even when it is completely transparent.

Create a motion tween at frame 60 in the hair layer. Insert keyframes at frames 80 and 90. Move the playhead to frame 90. Select the hair symbol. From the Properties Inspector, select None in the Color drop-down. Create a motion tween at frame 80. Scrub the frames in the hair animation to see the results of your work. The hair should fade out for a time and then fade back in.

Tweak your timing

Now that all of the keyframes are in place for the animation, you want to adjust the timing. You do so by adding and removing tween frames between your keyframes. Flash automatically recalculates the tween between keyframes for you.

To insert frames into all layers in the stack, position the playhead between the keyframes where you want to insert more frames. Press F5 to add frames. Press Shift+F5 to remove frames. Be sure that you don't have individual frames selected. If you do, you only insert frames on the selected layer. Use this process of adding and removing frames to adjust the timing of the face animations.

Moving on

You've learned the basic of animating in Flash MX. This is only the first step in your quest to become a proficient Flash animator. In Lesson 4, you'll add some interactivity to Face Facts by adding ActionScript to frames and buttons. If you've had no experience with writing script, don't worry; we only scratch the surface of the immense power of Flash MX ActionScripting. Flash makes adding interactivity to Flash movies simple and straightforward. You'll also add text to the project using the Text tool.

Before you move on to Lesson 4, take a few minutes to do the assignment and take the quiz for this lesson. They help solidify what you've learned. Don't forget to check the Message Board and post any questions you have.

Assignment #1

You've completed the animation process of adding keyframes to the Timeline and making changes to the symbol properties or shapes at those keyframes. You've tweaked the timing of the keyframes to change the pace of the animation. It often takes time to really make an animation look and feel as you intended. It's a process of adjusting timing, adjusting again, changing a few keyframes here and there, and re-evaluating your work. Rework your animations until you're satisfied with the final looks and timing.

Experiment with the Color Properties you used to animate the hair. Use Tint in place of Alpha. Make the hair change color or grow gray.

Quiz: #1

Question 1:
What's the red line running vertically through the current Frame called?

A) Player
B) Timeline
C) Framehead
D) Playhead

Question 2:
What are the frames between the Keyframes called?

A) Twains
B) Inbetweeners
C) Tweens
D) Twins

Question 3:
What are reusable assets that are stored in the Library called?

A) Signs
B) Cymbals
C) Books
D) Symbols

Question 4:
What are the three types of Symbols? (Check all that apply.)

A) Movie Clacker
B) Button
C) Push Button
D) Image
E) Movie Clip
F) Graphite
G) Graphic

Question 5:
True or False: To create a Motion Tween on the Timeline, you must use a Symbol.

A) True
B) False

Question 6:
True or False: Shape Tweens are used to morph one shape to another.

A) True
B) False

Add ActionScript to your movie

In this lesson, you transform Face Facts from animation into interactive media by adding user control via buttons and ActionScript. You learn to import images into Flash and to add text with the Text tool.

Explore Flash ActionScript

ActionScript is the scripting language developed by Macromedia exclusively for Flash. It evolved from small code snippets in earlier versions of Flash into a true object-oriented programming language similar to JavaScript. The syntax of ActionScript is based on ECMAScript, the standardized version of JavaScript. If you know JavaScript, you should have no trouble learning ActionScript.

Many Web sites and books have been devoted to the vast topic of ActionScript. Visit FlashKit , a Web site that addresses all levels of Flash programming and design. This course barely scratches the surface of ActionScript, but we encourage you to explore more ActionScript if you're interested.

The Actions panel

Flash MX enables you to add simple scripts to your buttons without advanced programming knowledge. The Actions panel is your interface with ActionScript. To open the Actions panel, select Window > Actions or press F9 on your keyboard. The Actions panel appears near the Properties Inspector.

ActionScript can be attached to frames, buttons, and movie clips. ActionScript can even be imported at runtime or loaded externally via other Flash movies. In this lesson, we focus on using frames and buttons to attach ActionScript, as shown here.

Control the Player

In its current state, Face Facts plays from start to finish starting at frame 1. Using ActionScript, you can pass instruction to the Flash Player under certain conditions, such as:

- When the user clicks a button
- When the Player reaches a predetermined frame

Because your animation is broken up into sections and you want the user to be able to control which section she views, you need a method to reference each section. You could reference your sections via their beginning frame numbers. Before final tweaking, the eyes section started at frame 1, the mouth section started at frame 30, and the hair section started at frame 60. If you adjusted the timing of your animations as recommended at the end of Lesson 3, your start frames for your sections have changed. Note the start frames in your animation now. Write them down if you need to.

If you use these start frames as a reference for ActionScript, you're telling the Player, "Go to frame X and do something (typically either play or stop)." This method works fine, unless you decide to adjust the timing again or add additional animation in a section. Then you would have to note the start frames again and change your ActionScript accordingly. There's another method that provides you with more flexibility than frame numbers do: labels.

Use frame labels

You give a name to a keyframe with a frame label. No matter what frame number that keyframe has, its label stays constant. It's good practice to create a separate layer for your labels to maintain clarity and layer organization. Add a layer at the top of the layer stack and name it labels. Insert a keyframe in the labels layer at the start of each animation section. You should have three keyframes, one each for eyes, mouth, and hair.

Select the first keyframe in your labels layer, which should be on frame 1 of the Timeline. This is the start frame for the animation of the eyes. Open the Properties Inspector. On the far left-hand side, type the word eyes in the Frame Label input field. Repeat this process to label the other two keyframes in the labels layer. Label each section appropriately, according to its section content: mouth for the mouth animation and hair for the hair animation.

Attach ActionScript to frames

Remember from Lesson 3 that you made each animation section start and end at a common expression (in our case, we had our face smiling and the eyes wide open). Now you'll see the

reason for this. When the user has viewed a particular section of Face Facts, you'll want the Player to reset to the start of that section. No matter which animation the user selects, the animation always returns to the same starting expression. This makes the transitions seem more fluid.

The simplest way to tell the Flash Player to "go back to the beginning when you reach the end" of a section of animation is by attaching ActionScript to keyframes. Insert a new layer above labels in the layer stack and name it script. Like the label layer convention used earlier, it's good practice to put all frame ActionScript on its own layer. Insert keyframes on the last frame of each animation section in the script layer. For instance, if the hair animation starts at frame 60, insert a keyframe at frame 59. When you've done this for all three sections, you should have three new keyframes. You're going to place ActionScript on these keyframes that tells the Player to "go back to the beginning of this section."

Select the keyframe in the script layer that is at the end of the eyes section and open the Actions panel by pressing F9. There's written a description at the top of the Actions panel that says something like, "Actions for Frame 29 of Layer Name Script." (The frame number in your case is most likely different.) The Actions panel is divided into two main areas. On the left side is a list of ActionScript commands organized by type and function. On the right is the Actions window where you can see the actual text of the ActionScript you're creating. Click the arrow between the two sections to minimize the list, because you're primarily concerned with the right side of the Actions panel.

There are many ways to add or write ActionScript in the Actions panel. Let's focus on the easiest method, normal mode. At the top left corner of the Actions window is a button with a + sign on it. This button adds Actions to the window and applies them to the keyframe that you selected. Click the Add Actions button and open the drop-down menu, which reflects the list you saw on the left side of the Actions panel. From the drop-down menu, select Actions > Movie Control > goto. In the Actions window you see

```
gotoAndPlay(1);
```

This is the literal ActionScript code that controls the Flash Player. Above the Actions window are a number of options. At the top of the list, select Go to and Stop. You don't want the animation to loop in this case. If you did, you would leave the Go to and Play option checked. From the Type drop-down menu, select Frame Label. This option tells the Player to look for the labels you created instead of a frame number or one of the other options available. From the Frame drop-down menu, select eyes. You're on the last frame of the eyes animation, and you want the Player to return to the beginning, which, in this case, is the frame you labeled eyes. The Actions window reflect the changes you made and shows:

```
gotoAndStop("eyes");
```

Wasn't that simple? You've just added your first line of ActionScript.

Flash also lets you preview simple frame scripts in the Workspace. Select Control > Enable Simple Frame Actions from the top menu. Position the playhead at frame 1 and press Enter on your keyboard. The playhead plays as normal until it gets to the final frame in the eyes animation, then immediately returns to the eyes frame and stops.

Repeat this entire process for the last frames in the other two sections. Remember to be sure the appropriate frame is selected on the Timeline and listed in the Actions panel before you add actions. The script for the last frame of the mouth animation should be

```
gotoAndStop("mouth");
```

For the hair animation, the script is

```
gotoAndStop("hair");
```

After you have all the Actions in place, position the playhead at the start of each section and press Enter. The playhead should play through the animation and at the final frame return to the beginning. Minimize the Actions panel so you can watch your animation in action.

You need to add one more Action. Select keyframe 1 in the script layer. In the Actions panel, select Actions > Movie Control > stop. Now, when a user loads Face Facts, the playhead stops at frame 1 and waits until the user clicks one of the navigation buttons before playing any animation. Minimize the Actions panel by clicking anywhere on the title bar of the panel.

Add buttons

At the moment, there's no way for the user to interact with Face Facts. If you published the movie now, the user would see only the eyes animation. You need to add buttons that allow the user to navigate through the movie.

Import images

Photos add interest

When creating animations in Flash, incorporating digital photos can create impact and interest in a way that simple animation won't. HP digital cameras

You'll use images for the graphics in your buttons. Using images instead of vector objects serves two purposes in this course. First, you learn to import images in your Flash movies. Second, using images for the buttons segues into Lesson 5, which covers accessibility issues.

Flash enables you to import a number of different image formats. To simplify the process in this lesson, though, we've provided image files for you, so you won't have to create the images first. Download the images, which are in the .gif format. The images are included in a Zip file, buttons-new.zip . Extract them and put them in the same folder as the faceFacts.fla Flash file.

Select File > Import from the top menu. The Import dialog box opens. Navigate to the folder where you saved the images. Select all of the images for the course and click Open. The images are imported into Flash and appear on the Stage. Press Delete on your keyboard. The images are now in the Library like your symbols. To use them in Face Facts, you only need to drag instances of them onto the Stage.

Create a button

The images for the buttons are named for the section they control and the state of the button. For instance, btnEyesDown.gif refers to the eyes section of your movie and the down state of the button. We'll discuss button states in more detail a little later. For now, know that there are three images for each button.

Insert a new layer below labels and name it buttons. You'll put the buttons on one layer. This works just fine because you won't be animating the buttons on the Timeline. Make sure the buttons layer is selected in the layer stack. Start each button creation process with the up state of the button, so drag an instance of btnEyesUp.gif onto the stage. Select the image with the Arrow tool. Press F8 to convert the image to a symbol. In the Name field, type btnEyes, and set the Behavior to Button. Click OK.

Understand button states

Using the Arrow tool, double-click the button you just created. The rest of the objects on the Stage fade out a bit and the Timeline shows four frames labeled

- Up (no mouse activity)
- Over (mouse over button)
- Down (left mouse button pressed and in down position)
- Hit (area within the symbol used to detect mouse activity)

The first three frames represent the three possible states of a button symbol in Flash. The states reflect the button's response to the user's mouse. As the button symbol detects the user's mouse activity, it goes to the appropriate frame. When a button is first created, there's a keyframe on the first frame only. If you do not insert additional keyframes, the button uses the first keyframe for all states. Insert keyframes in each of the four frames now.

You can create different effects for your buttons by making changes to the objects in each of the first three keyframes. You could make the button get bigger when the user positions his mouse over the button. You could also change the color of the button when the user clicks the button by changing the color of the objects in the Down keyframe. These are the some of the most basic things you can do in the buttons states. You could place an animated Movie Clip symbol in any of the first three keyframes and make the button animate in response to the user's mouse. In this example, you'll use images that simply change color each of the three button states.

The final keyframe, the Hit area, tells the mouse what area to use when determining the button states. The Hit area uses the region that is occupied by the shape in the Hit keyframe. For vector text, it's best to use a rectangle that covers the entire text object for the Hit area keyframe. If you were to use only a text object, the user would have to click exactly on the text object to activate the button; that can be troublesome and annoying. For your buttons, draw a shape in the Hit keyframe that reflects the size and shape of the button in your images.

Create the other button states

In the layer stack, rename Layer 1 to image. Select the Over keyframe in the button Timeline. Select the btnEyesUp image on the Stage, and press the Delete key. Drag an instance of btnEyesOver.gif onto the Stage. In the Align panel, click the To Stage button. With this option selected, all alignment adjustments you apply to objects are aligned to the Stage as well. Click the Align Vertical Center and Align Horizontal Center buttons in the Align panel to align the image to the center of the Stage. Remember, you're in the button's Timeline and not the main Timeline. Each Timeline has its own Stage. The alignment you made put the image in the direct center of the buttons Stage, not the main Stage. Aligning all the images to the center of the button Stage ensures that the images are lined up properly and don't appear to jump out of place when the user interacts with them.

Select the Down keyframe in the button Timeline. Select the btnEyesUp image on the Stage and

produce exceptional photos, and with large preview screens, you can see the photo on-camera before even transferring it to your computer.

» HP Photosmart M527 digital camera series

press the Delete key. Drag an instance of btnEyesDown.gif onto the Stage. Align this image to the center of the Stage using the same process described above.

Select the Hit keyframe in the button Timeline. Insert a new layer above the image layer. Name this new layer hit . Insert a keyframe in layer hit for the Hit frame. Using the Oval tool, draw an oval that overlays the button image. You may need to scale and adjust the Oval with the Free Transform and Arrow tools to accurately place it over the oval in the image. When you're satisfied with the Hit shape you've drawn, select the btnEyesUp image on the Stage and press the Delete key. Your button Timeline should look similar to Figure 4-1.

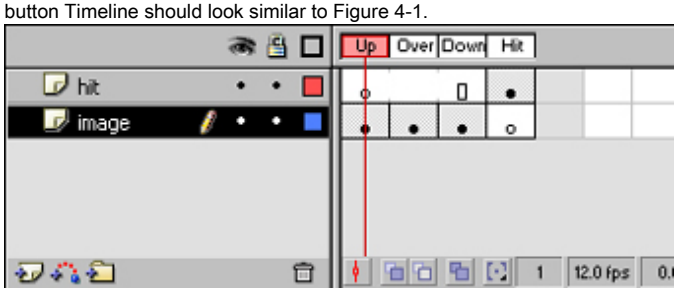

Figure 4-1: This is the final button Timeline with images on the Up, Over, and Down keyframes and the Hit shape drawn on the Hit keyframe.

To edit the main Stage and Timeline, double-click anywhere on the Stage. Repeat the process you just learned to create the two other buttons: Mouth and Hair.

You now have three buttons on the Stage: Eyes, Mouth, and Hair. Align them horizontally to each other and distribute them across the Stage. There needs to be only one keyframe in frame 1 of the buttons layer. Tween frames to last frame of animation to ensure that the buttons always remain on Stage and don't disappear. Flash normally inserts these tween frames to the end of the Timeline for you.

Add text

To create text to describe the three animations sections, first insert a new layer and name it text. From the Toolbox, select the Text tool, which is used to add text to your Flash Movies. Open the Properties Inspector to see all of the options for use with the Text tool, such as font, size, and color. We chose Futura Book, with a Font Size of 20, and white as the color. Choose an initial font setting for your text. You can change these settings later as needed. Click and drag a box on the Stage where you want to place the text. We put ours below the buttons, as shown in Figure 4-2. An input cursor and field appear where you click. In the field, type In Character animation, the eyes are one of the most important features. They are the feature that the audience generally identifies with first.

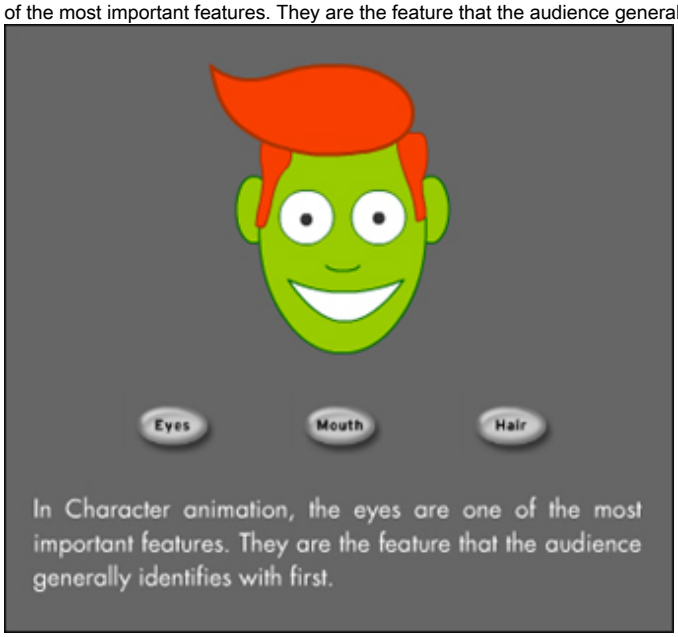

Figure 4-2: We placed text below the buttons.

Use the Arrow tool to select the text you just created. In the Properties Inspector, adjust the settings for Font, Size, and Color until you're satisfied with the results. You may also need to fine-tune the position of the text. Use to the Arrow tool to move the text into the desired position.

Insert a keyframe in the text layer at the beginning of the next animation section. It has the same frame number as your mouth frame label. Make sure that this new keyframe is selected. Double-click the text on the Stage to edit the text. Replace the text in this keyframe with In conjunction with the eyes, the mouth signifies a character's mood and expression.

Insert a keyframe in the text layer for the final animation section. It has the same frame number as your hair frame label. Make sure that this new keyframe is selected. Double-click the text on the

Stage to edit the text. Replace the text in this keyframe with A character's hairstyle or lack thereof can radically influence his or her persona.

You've now positioned text that describes the animation for each section of Face Facts.

Script the buttons

You're nearing the end of your scripting work on Face Facts. It's time to add the script to your buttons. Select the btnEyes button symbol by clicking it once, and open the Actions panel by pressing F9. Click the Add Actions button, open the drop-down menu, and select Actions > Movie Control > goto. In the Actions window, you should see this code:

```
on(release){ gotoAndPlay(1); }
```

The on (release) portion of the code is specific to buttons, and Flash inserts this code for you. Make sure that the gotoAndPlay portion of the script is selected in the Actions window. In the Type drop-down, above the Actions window, select Frame Label. In the Frame drop-down menu, select eyes. The Actions window reflects these changes and shows this code:

```
on(release){ gotoAndPlay("eyes"); }
```

Minimize the Actions panel. In the top menu, select Control > Enable Simple Buttons so that you can test simple button functionality within the Flash Workspace. Make sure that Enable Simple Frame Actions is also selected in the Control menu. Position your mouse above the Eyes button. The mouse cursor should change to the hand icon similar to the one used in Web Browsers. If you did everything right, the button should switch to the Over state and turn green. Click the Eyes button to play the eyes animation.

Test your movie another way

Here's another method to test you movies. In the top menu, select Control > Test Movie or press Control+Enter (Command+Enter on a Mac) on your keyboard. Flash generates a new window and shows your movie. This window is running your movie with the Flash Player. Testing your movie in this way is more reliable than using the Enable Simple Buttons and Enable Simple Frame Actions methods because you are seeing the actual Flash movie in the Player.

Click the Eyes button and play the eyes animation. Now, click the button, let the animation play for a second or two, and before it completes its cycle, click the button again. Notice that the second time you click the button, the animation stops. This is caused by the stop Action on frame 1. When you click the Eyes button, you're telling the Flash Player to return to frame eyes and play. The Flash Player does so. It returns to frame eyes, which is also frame 1, the frame where you inserted the stop Action. The Player encounters this stop Action and executes the script, stopping the playhead in the process. There's a simple fix for this problem that you'll learn now.

Close the test window to get back to the Workspace. Select the keyframe eyes in the Timeline. Now, click and drag the keyframe one frame to the right, placing it at frame 2. Now when the Eyes button is clicked, the Player goes to frame eyes but does not encounter the stop Action on frame 1. Press Control+Enter (Command+Enter on a Mac) on your keyboard and test your movie again.

Add actions to the other buttons

Select the Mouth button on the Stage. Open the Actions panel, click the Add Actions button, and select Actions > Movie Control > goto. Make sure that the gotoAndPlay portion of the script is selected in the Actions window. In the Type drop-down, above the Actions window, select Frame Label. In the Frame drop-down menu, select mouth. The Actions window reflects these changes and shows:

```
on(release){ gotoAndPlay("mouth"); }
```

Repeat this process and add the appropriate Actions to the Hair button. Be sure to select hair as the label in the Frame drop-down menu. The Actions window shows:

```
on(release){ gotoAndPlay("hair"); }
```

Test your movie again. Click all three buttons to test each section. Make sure that the text shows up at the appropriate time.

Moving On

In this lesson, you learned to create buttons that control the main Timeline, to import images for use in your movies, and to use frame labels and Actions. Although a somewhat simple project, Face Facts contains all the basic groundwork you need to create more advanced Flash projects. Apply

Download the source

Download this zip file that contains the source files and this buttons.zip to see the techniques in this lesson at work and try them for yourself.

what you've learned and hone your skills on your own and by completing the assignment and taking the quiz. Visit the Message Board to see what your fellow students are up to, and to post any questions you may have.

In Lesson 5, you learn about Web accessibility and the importance of considering the disabled as an important part of your audience. You'll then use the new accessibility features of Flash MX, and finally publish your movie.

Assignment #1

Now that you've added the interactive functionality to Face Facts, do you see any additions or modification you'd like to make? Here's a suggestion. Using what you learned in Lesson 3 about keyframe animation, make the text that describes the animations fade in as the animation plays. Animate the Alpha property as you did for the hair. The process is quite similar. Hint: The Alpha for the text needs to be 100 percent on the first keyframe of each animation section. Remember, when the playhead gets to the end of an animation section, it returns to the labeled keyframe and then stops. The fade-in animation needs to start after the labeled keyframe.

Quiz: #1

Question 1:
True or False: The Script panel is where you add ActionScript to your movies.

A) True
B) False

Question 2:
True or False: ActionScript can only be attached to Buttons.

A) True
B) False

Question 3:
What method can you use to reference Frames in ActionScript other than Frame numbers?

A) Size
B) Elapsed Time
C) Labels
D) FPS

Question 4:
True or False: When you import an image into Flash, it's stored in the Library.

A) True
B) False

Question 5:
What are the four Frames on the Timeline of a Button labeled? (Check all that apply.)

A) Up
B) Off
C) Over
D) Down
E) Pressed
F) Hit

Question 6:
Which of these snippets of code will tell the Playhead to move to a labeled Frame and play?

A) gotoAndPlay(1);
B) gotoAndStop("foo");
C) gotoAndPlay("foo");
D) gotoAndStop(2);

Publish for everyone

The Web is a medium for making information available to everyone, so you need to ensure that your content is accessible even to people with disabilities. This lesson gives reasons why accessible content publishing is the right thing to do and shows you how to make your Flash movie more accessible and usable to everyone. Then you'll finally get to publish your movie.

Inclusive Web design

Lesson 4 discussed the basics of ActionScript, Flash's native scripting language for interactivity. You used your ActionScript knowledge to provide interactivity and animation to your Flash movie, Face Facts. Now that you've completed your movie, you need to publish it for your friends and other Internet users to enjoy.

Know your audience

Keep in mind that not everyone can experience your content in the same way. Flash Player provides a consistent medium for presentation of Web content, so why wouldn't everyone experience it the same way?

The Internet is a medium for information dissemination. Anyone should be able to access your Web page information, even if he's not a typical Web user. For example, someone may have a slow Internet connection or an old computer. It's unlikely this person would get exactly the same experience as someone with a fast connection on a new computer.

The main group of atypical Web users we want to emphasize is the disabled. There are Web users with many types of disabilities, including

- Blind or low-vision users: Those who are either completely blind or have great difficulty seeing a computer screen. They may need a large format display or they may need to have screen text spoken to them. Most Web accessibility concerns revolve around this group.
- Deaf users: These people can't hear the audio feedback of a Flash interface or the soundtrack of a Web video. Since we're not using audio in this course, we aren't concerned with deaf users for now. If you continue Flash development and decide to incorporate audio, you should be mindful of this group's special needs by providing subtitles, alternate visual feedback, or some other audio equivalent.
- Mobility-impaired users: Some people aren't able to use a typical pointing device like a mouse. (And some nondisabled people even prefer using a keyboard instead of a mouse.) For this group, you need to make your Flash movie accessible from the keyboard, relying on the mouse only as a supplemental input device.
- Color-blind users: These people typically have trouble distinguishing between red and green colors, although many other types of color-blindness exist. Statistics show that about 1 out of 12 people has some sort of color vision deficiency. For these users, you must not use color as the only distinguishing factor in an interface. For example, don't use the phrase "Press the green button for Yes and the red button for No."
- Users with cognitive learning disabilities: This category can be very broad, ranging from disabilities such as dyslexia to severe mental retardation. Due to the wide scope of needs in this group, it's difficult to plan specific accessibility features, but we'll discuss some accessibility guidelines that help all people, including those with learning disabilities.

There are many different types of disabilities affecting people today. Chances are that you know a person with a disability of some kind. Your course authors are not disabled in any way -- other than perhaps some slight hearing loss from loud music -- but we feel strongly that the disabled can never have too many advocates. We hope this lesson raises some awareness for their benefit and we hope you'll keep their special needs in mind as you continue Flash and other Web content creation.

Let's discuss some specific accessibility challenges that affect these users and how AT (Assistive Technology) can help.

Get connected

With an HP notebook PC and a wireless WAN card, you have the freedom to work in Flash from nearly anywhere.

» HP Wireless wide area network (wWAN)

Enable the disabled

To provide a usable experience for people with disabilities, you must first understand the accessibility challenges they face, and the tools they use to overcome them. There are several standards and laws regarding Web accessibility that you should probably know about.

Standards and laws regarding Web accessibility

Section 508, the name commonly used for Section 508 of the Rehabilitation Act of 1973, as amended [29 U.S.C. ?794(d)], requires that government, educational, and many other public Web sites adhere to a standardized set of accessibility guidelines. You can learn more about these guidelines on the Section 508 Web site or on the Access Board Web site .

Visit an inaccessible Web site

The DRC (Disability Rights Commission) recently published an inaccessible Web site demonstration in Flash. The demonstration simulates how users with disabilities might experience a Web site that does not have essential accessibility features.

There are demonstrations for low-vision

The W3C (World Wide Web Consortium) is an international Web standards body and think tank self-described as "a forum for information, commerce, communication, and collective understanding" about the World Wide Web. The W3C's WAI (Web Accessibility Initiative) has issued many recommendations of Web technology including one for Web authoring standards called the WCAG (Web Content Accessibility Guidelines). The Web Content Accessibility Guidelines are split into three levels of recommendations:

- Priority 1 or Level A: Web content must satisfy this checkpoint.
- Priority 2 or Level AA: Web content should satisfy this checkpoint.
- Priority 3 or Level AAA: Web content may satisfy this checkpoint.

WCAG Level A covers the highest priority regulations, and should be considered a bare minimum for accessible Web content. Content must satisfy this checkpoint or some disabled users will find it impossible to access the information. For the most part, Section 508 and WCAG Level A cover the same topics and recommendations. Levels AA and AAA cover other recommendations to make content more accessible and usable, but these are not technically required for an accessible Web site.

For an in-depth analysis of the differences between Section 508 and WCAG Level A, read the side-by-side comparison on Jim Thatcher's Web site (http://www.jimthatcher.com/sidebyside.htm).

We encourage each of you to read the guidelines because they're invaluable resources for understanding Web accessibility as a whole. (Despite the technical look of the document, the Web Content Accessibility Guidelines are written in plain English and are quite easy to understand.)

Explore accessibility challenges and assistive technology

AT (Assistive Technology) refers to tools or services used to improve the capabilities of a person with a disability. AT can provide a more enjoyable and manageable user experience for the disabled. Let's look at several specific AT devices commonly used today.

The accessibility challenges we're discussing mainly revolve around vision-impaired and mobility-impaired users. These groups typically have the most difficult experiences with inaccessible Web content and therefore justify most of our consideration.

Help low-vision and blind users

Low-vision users (some are designated as legally blind) can see but most likely have difficulty reading small screen text. If possible, allow resizable text on a Web page or Flash movie. Many of these people use a program called a screen magnifier that enlarges all or a portion of their computer screen. Some of you may already have a simple screen magnifier installed on your computer.

Windows 2000 and Windows XP users can find their screen magnifier by selecting Start > Programs > Accessories > Accessibility > Magnifier. Mac OS X users can find their screen magnifier by selecting the Apple Menu > System Preferences > System > Universal Access > Seeing > Turn On Zoom.

Blind and mostly-blind people typically use an AT device known as a screen reader. As you learned in Lesson 1, a screen reader is a computer program that speaks screen text out loud to blind or low-vision users.

The most commonly used screen readers are

- JAWS by Freedom Scientific
- Window Eyes by GW Micro
- Home Page Reader by IBM

Each one has different features and behaviors, although your goal remains the same: to provide your content in an accessible way so that everyone can use it.

A screen reader can access text on the screen, but cannot describe images, graphics, or illustrations. You can overcome this problem by providing a text alternative -- that is, associating a bit of text with a non-text piece of content. When the screen reader encounters this item, it speaks the text alternative you provided. You'll learn how to provide text alternatives for Flash graphics on the next page.

Help mobility-impaired users

Users with mobility impairment may be unable to use a mouse or may use a different kind of

and mobility-impaired users, as well as a screen reader simulation of a blind user's experience.

pointing device like a light pen or joystick. Some users, such as those suffering from carpal tunnel syndrome, may prefer to use a keyboard even though they're physically able to use a mouse.

Whatever the situation, you should set up your Flash interface so that the use of a mouse is not required. You'll learn how to make Flash objects accessible from the keyboard and how to create a logical tab order through your Flash movie in this lesson.

Make Flash accessible

Macromedia has significantly improved the accessibility features of Flash with the release of Flash MX. If you're familiar with previous versions of Flash, you may have noticed some of them already.

Flash has many accessibility features that are outside the scope of this course, so for now, you'll only learn about the most important ones: text alternatives and tab order. Text alternatives help people using screen readers, and a logical tab order helps everyone using a keyboard. Use your tab key on the movie below to see for yourself.

Use the Accessibility panel

The Accessibility panel is a feature that enables you to provide text alternatives for each piece of your Flash Movie. Double-click an empty area of the stage to reset the Property Inspector to its default settings, shown in Figure 5-1. The Accessibility icon (a white figure on a blue circle) is on the right side of the Property Inspector.

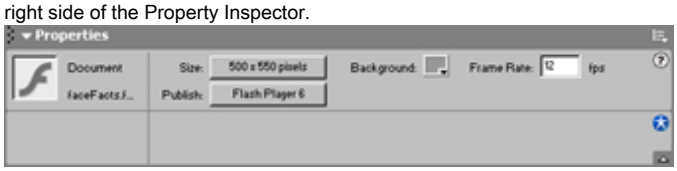

Figure 5-1: The right side the Property Inspector displays a blue Accessibility icon.

Macintosh users who found their screen zoom settings will recognize this as the icon used for the Universal Access control panel in the OS X System Preferences.

Click the Accessibility icon to open the Accessibility panel or select Window > Accessibility from the program menus. Because the Property Inspector is a contextual menu, the Accessibility icon may not always be available, but you can always open it from the Window menu.

Like the Property Inspector, the Accessibility panel's contents are contextual. Figure 5-2 shows a few possibilities of how the panel may appear.

Figure 5-2: The contents of the Accessibility Panel change depending the object that's selected.

View a larger version of this image.

The panel on the left displays the accessibility options for the Stage and movie. The middle panel shows the options typically available for symbols, such as buttons or movie clips. A disabled Accessibility panel is on the right -- plain shapes, like the ones you drew in Lesson 2, cannot have accessibility options applied to them.

Make your movie accessible

Set the accessibility options for your Face Facts movie:

- Make Movie Accessible: This checkbox enables screen readers to speak text sent from the Flash Player. With very few exceptions, this should remain checked.
- Make Child Objects Accessible: Leave this checkbox checked to make your buttons and body text accessible.
- Auto Label: A check here enables Flash to generate button and form labels automatically. For example, if you use plain text for buttons instead of importing raster graphics, you wouldn't have to explicitly label them. Flash can automatically look for text on, inside, or near an element and auto-label it.
- Name: Brief text that will be read in association with your movie. Name is the Flash equivalent

The best of both worlds

It used to be that in order to have the freedom of a notebook PC, you had to sacrifice performance. HP notebook PCs are the best of both worlds: the performance of a desktop, the mobility of a notebook, and at a price you can afford.

» HP Compaq nc4200 notebook PC series

» Notebook buying guide

of an HTML alt attribute. Type the words Face Facts into this field.

- Description: This field is for an extended description, should one be needed. Description is the Flash equivalent of an HTML longdesc attribute. Unless you want to add some other text here, you may leave this field blank.

Make your buttons accessible

In Lesson 3, you imported raster graphics to use as buttons. If you had used Flash text for your buttons, labeling them would be unnecessary, but since you didn't, you need to explicitly label each button. With the Accessibility panel open, select the Eyes button on the Stage. The Accessibility options change, and here's what to do:

1. Leave the Make Object Accessible checked.
2. Uncheck the box labeled Make Child Objects Accessible. This is irrelevant because the buttons have no child objects, but do it for good measure. There are other reasons to uncheck this box that we'll discuss later.
3. Type the button name in the field labeled Name. This text should correspond exactly to the text that is visible on the each button. For the Eyes button, type Eyes, for the Mouth button, type Mouth, and so on.
4. The Description field could also be left blank for the buttons. If you wanted to add something here, a possible sentence might be, "Learn the importance of eyes in animation." Our content is short, though, so a description is unnecessary and possibly redundant. Consider using Description if you have larger amounts of content. For example, if you use Flash for a complete Web site, a button Name might be Company Info and its Description could be "Information about our company. Learn who we are, what we do, and how to contact us."
5. Ideally, the Shortcut field provides a single keystroke to access a button, although getting it to work requires more ActionScript than we cover in this course. This is the closest equivalent to the HTML accesskey attribute. For now, leave this field blank.

If you'd like to use the Shortcut field, read up on Providing Keyboard Shortcuts and see "Capturing key presses" in Macromedia Flash Help (http://www.macromedia.com/macromedia/accessibility/features/flash/buttons_forms.html).

6. Repeat these steps for all three buttons.

Make your face graphic accessible

To make your face graphic accessible, you need to determine the level of detail you want to provide to disabled users. Not enough information can make for a useless movie, but too much information can make for an unusable movie. In future development, you'll have to weigh these options on a case-by-case basis.

In Face Facts, your primary accessibility concern is to provide access to the button names and related textual content. The animation is an added benefit for sighted users, but it's not necessary to understand the content.

Since we used Graphic Symbols on the main timeline, no accessibility features are available for the Face graphic.

If this entire graphic had been a Movie Clip symbol, you should probably not make the child objects accessible, but make up for it by providing a detailed Description. You decide what that description should be. The Name field should be something short and literal, such as Animated illustration of a face.

Set logical tab order

Remember that some users may access your Flash movie without a mouse. These users primarily use a keyboard and will navigate through your content using the Tab key. For this reason, it's important that you give your buttons a logical tab order.

An object on the main stage can be accessed from ActionScript as _root. plus, the instance name of the symbol. You gave each of your buttons a unique instance name: btnEyes , btnMouth , and btnHair .

The tabIndex property is an integer (number) that defines the tab order. This property is equivalent to the tabindex attribute in HTML. You can access the tabIndex property of any button by the variable _root.instanceName.tabIndex .

Make a new layer on the Timeline. Name this layer tabIndex, and open the Actions panel by selecting Window > Actions. In the left column of the Actions Panel, select Actions > Variables >

set variable. In the Variable field, type _root.btnEyes.tabIndex and in the Value field type 1. Repeat this process for the other two buttons but use the values 2 and 3.

When you're finished, the ActionScript code you've written should match the following:

```
_root.btnEyes.tabIndex = 1; _root.btnMouth.tabIndex =
        2; _root.btnHair.tabIndex = 3;
```

Figure 5-3 shows the Actions Panel in the finished state.

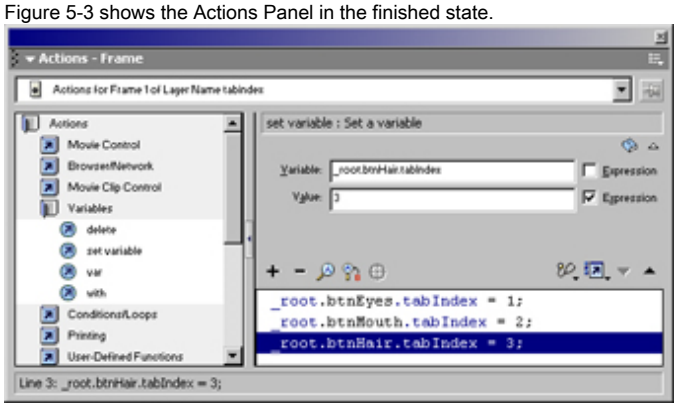

Figure 5-3: Provide a logical tab order by assigning the tabIndex property through the Actions panel.

View a larger version of this image.

Previously you've used the Publish Preview feature by pressing Ctrl+Enter (Command+Enter on the Mac). Unfortunately, the preview function is not accessible to the keyboard so you won't be able to test the tab order until you really publish your movie. Once you do, I encourage you to come back to this script and rearrange the tab order, just so you can better see how it works.

> You only have three buttons, so this tabIndex step was probably unnecessary; however, if you build an interface with many buttons, the automatic the default tab order may not be logical. Now if you run into an illogical tab order, you'll know how to fix it.

You'll learn how to publish your movie on the next page.

Bob Regan, head of the Macromedia Flash accessibility division, maintains a Web log dedicated to the Accessibility features of Flash (http://www.markme.com/accessibility/). This Web log is an invaluable resource for anyone interested in accessible Flash development.

Publish your movie

You're finally ready to publish your movie. We know you're excited, but this won't take much longer.

Publish as Flash

Select File > Publish Settings. On the Formats tab is a list of checkboxes and filenames. For the default setting, you have only the first two checked: Flash (.swf) and HTML (.html). These are the ones you need to publish a Web page.

If you'd like to name your HTML file something other than faceFacts.html, uncheck the box labeled Use default names. You may want to make it a directory index such as index.html.

On the Flash tab, you can select the Flash Player version you would like to use. This is a useful setting for backward compatibility, but you need to leave it as Flash Player 6 or none of the accessibility features we included will be used. Leave the other settings alone as well.

On the HTML tab, find the Template field. Use the default setting Flash Only, but take the time to look over the other templates, because you may need to use some of them in the future. For example, Detect for Flash 6 includes a JavaScript function that writes in the Flash object only if the user has the Flash Player 6 plug-in installed. A detailed analysis of these templates is beyond the scope of this course, but check the resources in Lesson 6 for help in this area.

If you consider yourself HTML-savvy and understand scripting variables, you may want to modify the default HTML templates. Most Windows users can find them in C:\Program Files\Macromedia\Flash MX\First Run\HTML. Most Mac OS X users can find them in /Applications/Macromedia Flash MX/First Run/HTML. The template files are plain HTML but include a few variables such as $WI for width, $TI for title, and so on.

Download the source

Download this zip file that contains the source file and to see the techniques in this lesson at work and try them for yourself.

One modification we made was to place the Movie Text variable ($MT) inside the <embed> element. This can benefit people using browsers incapable of receiving Flash content, such as the text-only browser, Lynx.

> Please be careful when modifying these templates. If you break them, you'll have a hard time finding replacements and may need to reinstall the program. It's far better to save a copy to create a new custom template (open a template and immediately Save As, using a different filename than the original).

In the Publish Settings dialog window, click OK to confirm your changes. Now select File > Publish or press Shift+F12 on your keyboard. That's it. You're done.

You can view these files in the same directory where you saved faceFacts.fla. If you would like to publish them to your Web site, upload the SWF and the HTML files using any FTP (File Transfer Protocol) program, such as WS_FTP for Windows or Transmit for Mac OS X.

Use other publishing formats

Flash can export to a variety of formats including, but not limited to, the following:

- Windows AVI
- Quicktime MOV
- Animated GIF
- Sequence of images in various formats

The benefit of publishing in other formats is that someone may be able to receive this other type of content, but not Flash. For example, Flash can be used (or abused) to create Intro Movies. A user without Flash cannot view this movie but might be able to view an AVI or Quicktime video.

You can publish in these other formats by selecting File > Export Movie. In the Save as type field (Format on a Mac), select the file type and click Save. You can also publish as a stand-alone projector file for Windows or Macintosh from the Format tab in the Publish Settings dialog window.

If you use XHTML and would like your Flash pages to validate, read Issue No. 154 of A List Apart, Flash Satay (http://www.alistapart.com/stories/flashsatay/).

Moving on

Take the time to do the assignment and take the quiz for this lesson. They'll help you assimilate what you've learned. As always, should you have any questions, please bring them to the Message Board.

In the next and final lesson, you learn some more tips and tricks for progressing your knowledge of the Flash Authoring Tool. We provide you with best practices techniques and a list of resources where you can learn more about Flash.

Assignment #1

Play around with your publish settings to see what works best for you. Go back and modify your tabIndex settings to see the effect it has on your movie.

If you have access to a Web server, use an FTP program to upload your files to your Web server and share them with the class by posting the URL to the Message Board. Unless you used the class example files, everyone's Flash movie will look slightly different, and it's always interesting to see other people's interpretations. You may want to try publishing in other formats as well. Send the URL to your friends and show off what you've learned!

If you're feeling especially industrious, use what you've learned to make a new Flash movie of your own creation. Publish it and post another note to the Message Board. We'd love to see it.

Quiz: #1

Question 1:

What type of disabled users should you consider when developing accessible Web content?

A) Vision-impaired users.

B) Hearing-impaired users.

C) Learning-impaired users.

D) All of the above.

Question 2:

The Web Content Accessibility Guidelines state that which of the following must be met for Web content to be accessible?

A) Priority 1 or Level A
B) Priority 2 or Level AA
C) Priority 3 or Level AAA

Question 3:

Which of the following is not a popular screen reader?

A) Home Page Reader
B) Window Eyes
C) Web Speaker
D) JAWS

Question 4:

Which of the following is the correct way to access the **tabIndex** property of a Flash symbol in ActionScript?

A) _root.tabIndex.instanceName
B) _root.instanceName.tabIndex
C) _root.tabIndex
D) _root.symbol.instance.tabIndex

Question 5:

Flash MX can publish to all of the following formats except ____.

A) Animated GIF
B) Windows AVI
C) Quicktime MOV
D) Motion JPEG
E) Stand-alone projector

Question 6:

True or False: In the Flash MX Accessibility Panel, you should always check the box labeled Make Child Objects Accessible.

A) True
B) False

Keep learning

This course teaches you the basics of Flash publishing, but Flash has much, much more to offer. This lesson discusses what you've learned and where to go to find more information.

What's next?

Learning Flash MX can be a daunting task. As with any program, it's best to learn in small chunks. We touched on many of the basics in this course, but you'll have to learn the rest without our help.

Don't worry. There are lots of things to learn and lots of people on the Internet willing to help you learn them. We'll give you a few topics to research and, later on, a list of resources to help you along the way.

Import material into Flash

You know how to import raster graphics to use as buttons, but that's only one of the many things you can import in Flash MX. Let's take a look at some of the other material you can import through File > Import:

- Other raster graphics: In Lesson 4, you imported GIF images to use as buttons for the movie, Face Facts. Flash also allows you to import other raster graphic file formats, such as JPEG (Joint Photographic Experts Group) and PNG (Portable Network Graphic). The JPEG format can save you file size on imported photographs. The PNG format supports a native alpha

Printing your tutorials

When working in Flash, it helps to have hard copies of tutorials and courses to consult easily while you're trying new effects. Print out your guides with an HP LaserJet, capable of printing multipage documents without missing a beat, and at a price you can afford.

» HP LaserJet 1022 printer series

channel that allows partial transparency on certain pixels. Experiment with each format because they all have different benefits.

- Vector graphics: Flash has the capability to import graphics from other vector-based drawing programs, such as Macromedia Freehand or Adobe Illustrator. Vector graphics are especially useful for their small file size and infinite scalability.
- Audio: Flash can import many different sound formats, such as MP3 and WAV. You can effectively use audio in Flash to produce short sound effects or even a longer soundtrack for your entire movie.
- Video: Flash MX can import and control video with ease. You can import video file types such as MOV, AVI, WMV, MPG, and so on.
- Other Flash movies: One of the coolest things about Flash is its capability to import other completed Flash movies in the SWF format. Start small. You can save little movies and then import them as symbols to a larger movie when you're ready.

There are other ways to import content into Flash, too. Some of them can even be done on-the-fly -- that is, while a person is viewing your Flash movie.

Import external ActionScript files by using the #include directive in the first frame of your movie. Importing ActionScript is beneficial because it enables you to share your plain-text script library across many Flash movies. It also enables you to centralize all your code instead of adding snippets in many different places throughout the FLA file. Here's the syntax for importing an ActionScript file:

```
#include "myCustomScripts.as"
```

Notice that the #include directive does not have a semicolon ending the statement. This is a special case and causes an error if you include a semicolon.

You can also import text content on-the-fly to load into your movie. The benefit of this is that you can separate your content from your Flash movie. As plain text, it's easier to update and could even be generated from a server-side scripting language, such as PHP (PHP Hypertext Preprocessor).

Import external symbol libraries to share all your Flash objects across multiple files. Instead of having to re-create objects each time you create a new movie, you can start with your symbol library ready to go.

Flash application developers commonly use XML (Extensible Markup Language) data. Flash can import and parse XML data for use in advanced applications. For example, Google provides XML data via its Web Services APIs , so you could theoretically build a Flash search engine running on Google content.

Use audio

You can use audio in Flash to provide background music, sound effects, or other aural feedback. If you play a song in the background, it's common courtesy to give the user a way to turn off the music. If you provide sound effects on your buttons or other areas, remember, "Less is more." A Flash Web page is not a video game (although it could be) and users can quickly be turned-off by annoying or loud sounds. Be tasteful in your audio choices.

One common use of Flash audio is to provide an audio alternative for vision-impaired users. You may want to record your own voice and use it for button sound effects in your Face Facts movie. For example, when you mouse over the Eyes button, the sound-effect could speak the word eyes. Audio feedback like this can help people with learning disabilities, too. If you add audio to the button, you may want to uncheck the Make Object Accessible box in the Accessibility panel so that the screen reader and your additional audio do not conflict.

For an example of this type of audio feedback in action, view one of the Homestarrunner Main Menus (http://www.homestarrunner.com/main4.html).

Audio can be used to enhance the experience of a vision-impaired user, but be sure to consider a deaf user's needs when adding audio. If the soundtrack provides essential information, you should include an option for subtitles.

If you're interested in providing subtitles for your videos, research MAGpie (Media Access Generator - http://www.homestarrunner.com/main4.html), developed by the National Center for Accessible Media (NCAM).

Use video

Since Internet connections are getting consistently faster, you may want to include video in your Flash movie. Keep in mind that video files are very large and can load slowly even on a broadband

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connection.

Flash MX provides much more control and incorporation of video than previous versions of Flash. Find out more about video in Flash at the Macromedia Flash Support Center .

If your video includes essential information, try to include an alternate audio track for vision-impaired users. This alternate audio track is common on DVDs and provides a spoken description of the video in between sections of dialog.

Learn advanced ActionScripting

We highly encourage you to learn as much as you can about Flash's native scripting language, ActionScript. Although you don't need much for basic Flash authoring, using more advanced ActionScript can unleash an enormous amount of control and interactivity. The possibilities are endless.

For more information about advanced ActionScript, scour the resources section at the end of this lesson.

Understand SWF

Macromedia recently released the Flash movie format, SWF, as an open format. What this means is that any number of applications can bypass the Flash Authoring Tool and write SWF files by themselves.

Vector drawing applications, such as Adobe Illustrator and Macromedia Freehand, can save directly as a SWF file, although of course you cannot provide animation from those programs. Even some video editing programs can export as SWF and include the video directly.

In our opinion, the best benefits of the open format are modules and libraries for various server-side scripting languages like Ming for PHP. These modules enable developers to create Flash movies directly from plain text programming code.

Look at some examples of Ming for PHP (http://ming.sourceforge.net/examples/). If you're interested in how the SWF files are created, all the source code is freely available. PHP and Ming are both open-source and free. If you have access to a Web server, you may request that your server administrator install the Ming module for PHP.

Now that you've learned what you can do, let's take a look at what not to do.

Watch out for these mistakes

Beginning Flash authors tend to make a lot of the same mistakes. You, as a beginning Flash author, are no exception. Mistakes can be frustrating, but what you learn from them helps you avoid them in the future.

Although making mistakes is a beneficial part of programming, we'd like to tip you off to a few mistakes we've made at times, so that our experience might save you some of the headaches and nail biting we've been through.

Avoid letterforms as Hit areas

If you use plain text for your buttons, make sure you include a larger Hit area instead of just using your letterforms. The reason becomes obvious in practice.

If you use only letterforms as your Hit area, the button activates only when the mouse is exactly over the letter. Any transparent space between letters or even inside of a letter does not activate the button. For example, if you used a text-only Hit area for the Mouth button in your movie, Face Facts, the button would not activate inside the letter O. Instead, the user would have to click the outline of the letter.

Don't rush to play

One common mistake is to play a movie before it is fully loaded. Sometimes it isn't necessary to preload a movie, but in many cases it can help. Because not everyone's Internet connection is the same, your Flash movie can take longer to load on some people's computers.

Face Facts is relatively small piece, so preloading is probably not necessary, but you may want to preload your larger movies. It's common to place a loading graphic at the beginning of your movie and import any external files on frame 1. We sometimes make a preloader by placing a frame looping Movie Clip on frame 1 of the main movie. We also need a stop() command in frame 1 after

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all the imports.

We can check to see if a movie is completely loaded by comparing the number of frames already loaded to the total number of frames in the main movie (_root). This preloader might go on frame two of the Movie Clip symbol:

```
if(_root._framesLoaded < _root._totalFrames){ prevFrame();
        } else { _root.gotoAndPlay(2); }
```

Or, by comparing the file size loaded to the total file size of the movie:

```
if(_root.getBytesLoaded() < _root.getBytesTotal()){
        prevFrame(); } else { _root.gotoAndPlay(2); }
```

In plain English, these bits of code mean, "If the main movie is not fully loaded, go back one frame in the child Movie Clip." Because the Movie Clip is playing, frame 1 plays on through to frame 2. With this code on frame 2, it runs again. This loop continues until the movie is completely loaded, and the ActionScript starts the main movie playing on frame 2.

Don't worry if you don't understand all of that yet; just realize that preloading your movie can prevent jumpy animation or trying to play a frame that hasn't loaded yet. In the same way, you can get a logic error in ActionScript if you refer to a function, variable, or object before it is loaded. We'll get to logic errors in the next section.

Common ActionScript mistakes

Like any programming language, ActionScript has the possibility for errors. There are two main types of errors in programming: syntax errors and logic errors.

Syntax errors are caused by code that does not follow the basic syntax of the language. For example, you may forget to close a quoted string:

```
var foo = "test; // missing second quote
```

Fortunately, syntax errors are usually easy to track down because the program knows where they are. You will never have a syntax error if you use Normal Mode in the Actions panel. If you type a syntax error while in Expert Mode, you cannot switch back to Normal Mode. Instead you get a message that says, "This script contains syntax errors. It must be edited in Expert Mode," as shown in Figure 6-1.

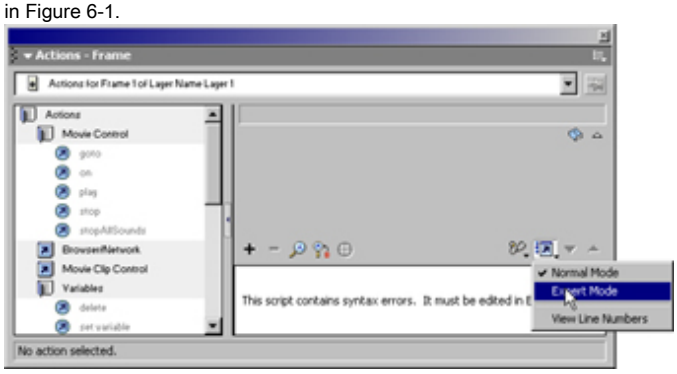

Figure 6-1: If you type a syntax error into the Actions panel under Expert Mode, you have to fix it before you can return to Normal Mode.

View a larger version of this image.

There are many different reasons for logic errors. Unfortunately, these errors can sometimes be very difficult to track down. We cannot go over all the different possibilities of logic errors, but we can give you an example:

```
gotoAndPlay(myFrame);
```

The syntax of the preceding statement is fine. The function is valid and it's passed one variable. The variable, myFrame , should either be a frame number (integer) or a frame label (string). Because it's a variable, though, its value might change before this statement runs. myFrame could contain a frame label that does not exist or may refer to a different data type, such as an object or floating point number (decimal).

You can usually use the Trace Window and the Script Debugger to find logic errors. If you get an error on a piece of code like this statement, try the following:

```
trace(myFrame); gotoAndPlay(myFrame);
```

Now use the Publish Preview, and the Trace Window will show the current value of the myFrame variable, just before the error is thrown. If it's the wrong type, this could tip you off to finding the bug.

Because the trace() function is used only for debugging, you do not need it for the final output of your movie. Select File > Publish Settings > Flash tab, and check the box labeled Omit Trace actions.

Understand case sensitivity in ActionScript

In programming, case sensitivity means that uppercase and lowercase letters are treated as completely separate characters. If a language is fully case sensitive, foo and Foo are not the same word. If a language is not case sensitive, or case insensitive, foo and Foo are the same.

ActionScript is partially case sensitive, meaning that some words (like the reserved keywords if , while , and so on) are case sensitive and some (like custom variable names) are not. This can be confusing, but it was done to ensure backward compatibility with Flash 4 and Flash 5 ActionScript.

Although certain words in ActionScript are case insensitive, we encourage you to treat everything as if it were fully case sensitive. Precision coding helps you avoid errors.

If you have trouble tracking down an error, check the case of your code. It's quite common for beginning programmers to overlook case-sensitivity.

Compare frame loops versus script loops

In the preloader example, you saw an example of a frame loop. A frame loop is a bit of code on one frame that conditionally sends the playhead back to a previous frame. When the playhead returns to the original frame, the conditional code runs again. A frame loop is a common way to run the same bit of code over and over.

There are other types of loops, called script loops, which you can use with ActionScript. They include for loops and while loops. Script loops have their place, but sometimes it's better to use a frame loop. For example, we could have done our preloading with a while loop.

Do not use the following bit of code. It has a few unfortunate side effects we will discuss.

```
while((_root._framesLoaded < _root._totalFrames){ 0;
        // this line does nothing }
```

In plain English, this code means, "If the movie has not fully loaded, wait." Ideally, this code accomplishes the same thing as the previous preloader. In practical use, however, it can cause problems. While the script loop is executing, the Flash Player plug-in can do nothing else. This means that the Web browser may freeze or the computer may even appear to crash.

The Flash Player has a built-in mechanism to avoid infinite loops in ActionScript. Like it sounds, an infinite loop is a loop that never stops. The following is an example of an infinite loop:

```
// infinite loop var foo = 1; // foo is equal to one while(foo>0){
        // while foo is greater than zero foo++; // add one to foo } //
        foo is still greater than zero, so loop continues
```

Sometimes, like in a looping animation, infinite loops are done purposefully. Other times, usually in code, they are an accident.

If the loop runs for too long a period of time (15 seconds), the Flash Player stops executing the script and present a message to the user that says, "A script in this movie is causing Macromedia Flash Player 6 to run slowly. If it continues to run, your computer may become unresponsive. Do you want to abort the script?" You may never see this problem, but a person on a slow modem connection might. For this reason, we do not recommend a script loop for preloading.

See Pausing a Flash Movie on the Macromedia Flash Support Center for information about frame loops and script loops (http://www.macromedia.com/support/flash/ts/documents/f5_pauser.htm).

Use Flash MX resources

By now, you've learned enough about Flash MX to realize that this course only scratches the surface of its use. As we've stated before, the possibilities are endless. The best thing we can do for you now is to point you toward resources where you can learn the rest on your own.

Find information

As you have probably guessed from some of our sample URLs, the Macromedia Web site is a great source of information about Flash.

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The Macromedia Flash Support Center provides news and information about the Flash product line, as well as code samples and articles on the Flash Authoring Tool. The Support Center also provides a searchable database of information on Flash.

The Macromedia Flash Forum is a Web forum with discussion threads on all aspects of Flash development. Sign up and read the forum overview to get started, and then search for some interesting threads or start a new one with your own question.

Flash Kit is a Flash developer's resource Web site. It provides links to articles, news, showcases, message board, and many other beneficial resources.

Colin Moock has written several books on Flash and ActionScript. He maintains a personal Web site containing code samples, authoring tips, Flash examples, and links to other Web resources.

Bob Regan's Accessible Flash Web log is an excellent source of practical information and tips on how to make your Flash movies more accessible to people with disabilities. Mr. Regan is the head of the Macromedia Flash Accessibility team.

WCAG (Web Content Accessibility Guidelines) are not specifically related to Flash, but we encourage you to read over them anyway. Knowledge of this subject raises your awareness and is beneficial to anyone creating Web content.

Find inspiration

The Macromedia Web Site of the Day is a showcase of contemporary work built with Macromedia products. It used to be mainly Flash but lately we've seen more Director (Shockwave) Web sites showcased. In any case, the work is usually fantastic.

Homestarrunner.com is an entertainment Web site that your humble authors can't seem to get enough of. We especially recommend Strong Bad's advice on Web site development .

Shockwave.com is another Macromedia entertainment Web site featuring games and other interactive pieces produced mainly in Flash and Director.

We also mentioned a few Web sites in Lesson 1 that you may remember:

- Nike Lab
- JoshuaDavis.com
- Cartoon Network

You've learned a lot

Let's briefly recap what you learned in this course.

In Lesson 1, you learned a little bit of the history of the Internet and how it came into being; the difference between raster and vector graphics; that Flash Player is an HTML-embedded technology that is usually viewed as part of an HTML Web page; and that the Flash Authoring Tool enables you to create and publish Flash movies.

In Lesson 2, you began using the Flash Authoring Tool and learned how to draw simple graphics in Flash; how to use some other tools to help you manipulate graphics on the stage; about the Timeline; and how the layer stack works.

The final source

Download the complete and final zip file containing the source file and then try some Flash magic of your own using the resources suggested in this lesson.

In Lesson 3, you learned about frames, keyframes, shape tweening for animation, symbols, and the library, and then you animated eyes, mouth, and hair in Face Facts.

In Lesson 4, you added interactivity to your movie by utilizing ActionScript, Flash's native scripting language, and then created buttons by importing raster graphics and assigning actions to them.

In Lesson 5, you learned about some problems with Web accessibility and how you could use the new accessibility features of Flash MX to benefit users with disabilities. You also learned how to modify your publish settings and publish your movie for the world to see.

And finally, this lesson gave you some ideas for continued Flash learning, and gave you a list of resources to help you learn more.

Moving on

We sincerely hope that you've enjoyed this course and learned a lot. If you have any questions, please post them to the class Message Board to see if any of your classmates can answer it. Do the assignment and take the quiz to complete your course work.

Thank you.

Quiz: #1

Question 1:

Which of the following cannot be imported into the Flash Authoring Tool by using File > Import?

A) Video
B) XML data
C) Vector graphics
D) Audio

Question 2:

What's the correct syntax for importing an external ActionScript file?

A) #include myCustomScripts.as
B) #include myCustomScripts.as;
C) #include "myCustomScripts.as"
D) #include "myCustomScripts.as";

Question 3:

What's the common name for a script that makes sure the movie is fully loaded before allowing it to proceed?

A) Preloader
B) Load-up
C) Movie loader
D) Load balancer

Question 4:

Which of the following best describes ActionScript's case-sensitivity level?

A) Fully case sensitive
B) Partially case sensitive
C) Not case sensitive (case insensitive)

Question 5:

What's the common term for a loop that never stops looping?

A) never-ending loop
B) infinite loop

Question 6:

Which type of loop did we recommend for the preloading example? (Hint: There were two examples, but we recommended against using one.)

A) script loop
B) frame loop