Chapter 3: Animation

After completing this module, you’ll be able to:

• create, comment, and use frames and keyframes.
• distinguish types of Flash animation.
• create motion tween animation.
• control animation with motion guide.
• control animation with easing.
• create shape tween animation.
• save and share your animation.

If you just wanted to create graphics and text, many software packages would work. What makes Flash exciting is animation! Animation involves change over time. The Timeline is used to manage your graphic elements.

Creating Frames and Keyframes

The Timeline is the key to animation. As you look at the Timeline you’ll notice the numbers across the top and the layers along the left side. Each number has a matching frame. These frames are white when they are empty and turn gray when they contain content.

To create animation, you’ll be manipulating two types of frames: keyframes and regular frames.

A keyframe is a point in your movie where new content first appears. They are the key to animation. In keyframes you can also scale and reposition elements. The first frame of each layer is a keyframe. You can always identify the keyframes because they contain a tiny filled circle.

Regular frames are static and contain the same content as the preceding keyframe. They’re sometimes called “slaves” to the keyframe. Frames contain a hollow circle.
Right now our movie only contains one frame, a keyframe. You’ll want to estimate how many frames you think you’ll need in your movie. We’re going to create an animation that’s about 10 seconds in length. Most developers use a frame rate of 12 frames per second (fps) which is the default in Flash. For a movie 10 seconds in length at 12 fps, we’ll need 120 frames. We can always add or remove frames if we decide to change the length of our movie.

To insert frames on the Timeline:

Click on frame 120 of the welcome layer.

Look for the grey band at to find frame 120; click on it.

Shift-click on each of the other layers down to the cloud layer.

As you shift-click on each layer it will turn gray.

Pull down the Insert menu, choose Timeline, and select Frame.

The frames will all be shaded with gray because each layer contains content. The last frame (120) will contain a white rectangle.

Creating Keyframes

Right now, all the elements appear on the first frame and nothing happens for the entire length of the movie (120 frames). Not every exciting, huh? We’ll add keyframes at points in the movie where we want the content to change. For example, we want the runway to disappear after the plane has taken off and we don’t want the grass or house to show until the plane has reached the end of the runway. We might want the cloud to appear, disappear, and reappear in a different position giving the feeling that the airplane is moving across the sky. At this point, we can only guess where we want these changes to take place. Keyframes are easy to adjust if we decide we want to change the timing of different elements.

Let’s start with the Welcome layer containing our text Rather than showing the question “Have you ever wondered how airplanes fly?” at the beginning of the movie, let’s just show it during the last 20 seconds of our movie. We’ll make a new keyframe at Frame 100. Then, delete the content from Frame 1.
To add a keyframe:
Click Frame 100 of the *Welcome* layer.
Sometimes, it’s difficult to tell which frame you’re selecting. The status bar at the bottom of the Timeline shows the selected frame.
Pull down the Insert menu, choose Timeline, select Keyframe.
You can also use the F6 key to insert a keyframe.
A solid black circle will appear in Frame 100. Notice that there’s now a line between Frames 99 and 100. A rectangle appears in Frame 23 indicating the end of the frame segment.
Click on Frame 1 of the *Welcome* layer.
Press the Delete key.
Notice that Frame 1 of the *Welcome* layer now has a white circle rather than a black circle. Also notice that the frames between 1 and 99 are now white which means they are empty.

Commenting Frames

Since our movie is only 10 seconds long, it’s not difficult to remember what happens in the project. However if your movie were 10 minutes, there could be hundreds of keyframes. **Frame comments** allow developers to record text descriptions for keyframes. This helps you remember the events that take place at important points in your animation. These comments won’t be exported or viewed by end users, so they don’t need to be pretty, just descriptive.

To add a comment to a frame:
Select Frame 100 of the Welcome layer.
You should select the frame where you wish the comment to be recorded.
In the Properties panel, click in the area under the word Frame.
Type: //question appears

All comments should start with 2 slashes. This indicates that they are comments, not frame labels.
Notice that your frame comment now appears in the Timeline.

Creating Animation

Flash contains cool features for creating a variety of animations. Flash offers four ways to create animation.

**Frame-by-Frame.** The most flexible approach is called frame-by-frame animation. With this type, the developer makes small, individual changes to objects on the Stage within every frame. Although effective, this can be very time-consuming. If you’ve tried making a flip-book or creating clay-mation, you’re familiar with this approach. Since Flash is a frame-based program, it’s easy to move from frame-to-frame to make these changes. With frame-by-frame animation, you can make incremental changes in the placement of the object to give the appearance of motion (i.e., swinging pendulum, playing on seesaw, or raft floating on water). In addition, you can change the object itself, so it looks like it had been transformed (i.e., pumpkin turns into a jack-o-lantern, a frown turns into a smile, a plant grows).

Tweening is a technique used to make animation much easier. The developer identifies a start point and end point, then the software figures out the positions of the objects “between.” Flash contains two types of tweens: motion tweens and shape tween.

**Motion Tweening.** Motion tweens move objects from one place on the Stage to another. For example, we’ll move the airplane across the Stage. The developer places an object at the starting point at a Keyframe. Then, creates a Keyframe somewhere along the Timeline and moves an instance of the object to the end point. The creator returns to the beginning frame and chooses the motion tween option. The software then moves the object on a direct path from the beginning to the ending point. Flash provides options
to tweak the tweening so that it looks more realistic. For example, motion guide can be used to move the animation along an established line so it looks like a plane is taking off. Easing is used to make it look like a ball is really bouncing.

**Shape Tweening.** Shape tweens morph one image into another image. For example, we’ll change the shape of the cloud as it moves across the Stage. You could also change circles into stars, a seed into a plant, or a bike into a car. Keep in mind that shape tweening only really works well with the vector graphics. In other words, Flash shape tweening won’t work well on a photograph of a human face, but it would work for a line-based smiley face.

**ActionScript.** Besides frame-by-frame and tweening, objects can be animated using ActionScript. In addition to animation, scripting is also used for highly interactive projects such as video games and simulations. Finally, you can also choose from pre-built animations provided by Flash.

**Creating Frame-by-Frame Animation**

Let’s have some fun with frame-by-frame animation. For this assignment, let’s create a web page banner rather than a standard screen size document.

We’ll begin by creating a new document and setting the page properties.

To set the page properties:
Create a new document.
In the PROPERTIES area of the Properties panel, choose to Edit...
next to the Size option.
Change the size to 550 x 100 pixels.
Notice that you can change the Background Color and Frame rate here.
Next, we’ll create a picture for the simple animation. Use the line and shape tools to draw a simple stick person on the extreme left side of the screen. You could also draw a globe, basketball, car, or other object. For a circle, click the Rectangle tool and draw a circle. Use the line tool to create lines.

Building the animation involves creating a series of keyframes with small changes to the figure. The default setting is 12 frames per second. Let’s create movement every 5-10 frames.

To create frame-by-frame animation:
Click on Frame 5. Pull down the Insert menu, choose Timeline and Keyframe. Note the dot.
Click on Frame 15. Add another Keyframe. Also add Keyframes on 20, 25, 30, and 40.
Click on Frame 1. Pull down the Edit menu, Select All. Pull down the Edit menu, choose Copy.
Go to Frame 5. Pull down the Edit menu, choose Paste. Go to all the other frames and paste.
Go back and make small changes on each Keyframe such as moving legs or arms. You can also go to the Modify menu and choose Transform to make changes such as rotation.

To test your animation:
Pull down the Control menu and choose Test Movie.
To use your controller, pull down the Window menu and choose Toolbars and Controller. The Controller provides more flexibility in viewing your project.
Pull down the File menu, choose Export, and Export Movie.

By saving the movie as an .SWF file you can share your project with others and even insert it into a web page.
Creating Motion Tween Animation

The most common animation technique is motion tweening. You simply provide Flash with a starting point on a keyframe and an ending point on another keyframe. Then, you set the motion “tween” and watch it animation!

The motion tween animation options have changed dramatically from earlier versions of Adobe Flash. If you have an older version, you’ll need to adjust the instructions. The newest version contains both the “classic motion tween” as well as a new approach. We’ll try both in this section.

Classic Motion Tween

Keep in mind that you can only use graphic symbols and movie clips as motion tweens. We’ll create a motion tween to move our airplane across the Stage.

To create a “classic” motion tween for our airplane:
Unlock the airplane layer if you locked it earlier.
Ensure that your object is a SYMBOL before you create your animation. If you’re not sure, pull down the ModifToolbars, y menu and select Convert to Symbol. Give it a name and make it a graphic.
Select Frame 120 of the airplane layer.
Pull down the Insert menu, choose Timeline, select Keyframe.
Notice that the airplane copied to your new Keyframe.
Drag the airplane so it appears in the upper right corner of the Stage.

Figure 3-A. Classic Motion Tween.
Click Frame 1 of the *airplane* layer.
Tweens span the distance between the two keyframes. However, the tween is associated with the starting keyframe.
Pull down the Insert menu, choose Classic Motion Tween.
You’ll see that the *airplane* layer now has turned blue and contains an arrow.
Preview the tween on the Timeline by dragging the Playhead where the Timeline numbers appear. This is called scrubbing the Timeline. The Playhead is the number band across the top of the Timeline.
Or, pull down the Control menu, choose Test Movie.
Or, pull down the Window menu, choose Toolbar and Controller.

When you’re working with a Classic Motion Tween, use the Property menu to add easing and other features such as rotation of your plane clockwise (CW) or counter-clockwise (CCW).

**Motion Tween**
The second option for tween animation is the new Motion Tween option. The advantage of this approach is that you don’t need to mess with creating keyframes, the system creates a guide automatically.

To create a motion tween for our airplane:
Unlock the *airplane* layer if you locked it earlier.

*Figure 3-B. New Motion Tween.*
Ensure that your object is a SYMBOL before you create your animation. If you're not sure, pull down the ModifToolbars, y menu and select Convert to Symbol. Give it a name and make it a graphic.

Click on Frame 1 of the airplane layer.
Pull down the Insert menu, select Motion Tween.
The Timeline will turn blue from Frame 1 to 120.
Click on the Frame where you'd like to see your first movement, this case Frame 10.
Drag the airplane to the new location an inch above the runway.
A special Keyframe called a Property Keyframe will be added to the Timeline after you’ve changed the position of the graphic. It looks like a filled triangle.
Click on Frame 20. Drag the airplane back down to the runway.
Make movements for Frames 40, 80, 100, and 120 to simulate the way an airplane bounces down the runway.
Remember that you can start and end an animation off the stage if you wish.
If you wish to adjust the guide, click on the Property Keyframe containing one of the keyframes made by the tween and move the graphic. The guide line will automatically be adjusted.

The new Motion Editor provides additional tools for enhancing your Motion Tween. Click the MOTION EDITOR tab next to the TIMELINE tab. This allows you to change No Ease to Simple (Slow). You also have more precise movement of your Property Keyframes.

Creating Shape Tween Animation

It’s fun to morph images. Tweening shapes involves changing an object’s shape at one or more points in the animation. The software creates the in-between shapes for you. You can combine changes in position as well as changes in size, color, and transparency. You’ll want to work with just one shape per layer.
Unlike motion tweening that uses graphic symbols, you can’t shape tween on a symbol, text, or a group unless you break them apart. Shape tweening works best on objects that you create using the draw tools such as our cloud. Let’s try a couple shape tweens. First, we’ll create a simple alphabet book. We’ll start with an apple that changes into the letter A.

To create the shape tween:
Create a new document.
Click in Frame 1 of Layer 1.
Choose the paintbrush and the color red from the paint bucket.
Draw an apple in the lower left corner of the screen.
Select it. Pull down the Modify menu and choose Convert to Symbol, Graphic.
Now it’s in the Library in case you need it later.
Select your apple and pull down the Modify menu and select Break Apart.
This will turn your apple into tiny pieces.
Go Frame 20 and Insert a Keyframe. Click on this Frame.
Use your paintbrush to draw a letter A on the right side of the screen.
Select your A. Pull down the Modify menu and choose Convert to Symbol, Graphic.
Now it’s in the Library in case you need it later.
Select your A and pull down the Modify menu and select Break Apart.
This will turn your A into tiny pieces.
Go back to Frame 1.
Look below the Stage for the Properties window.
Choose Shape from the Tween drop-down menu.
Scrub the Timeline to see your results!

Let’s return to the airplane example. Rather than the cloud moving left to right, we want it to move from right to left. This movement will give us the illusion that the plane is passing the clouds.

To create a shape tween using our cloud:
Select Frame 120 of the cloud layer.
Actually, you could select any frame you want as the end of your morph process.
Pull down the Insert menu, choose Timeline, select Keyframe.
A keyframe will appear on the Timeline.
Unlock the cloud layer.
Select the cloud graphic with the pointer/arrow tool. Move it near the left edge of the Stage. Pull down the Modify menu, choose Break Apart. Pull down the Modify menu, choose Ungroup. Your cloud is now a series of individual curves. Select the Frame 1 of the cloud layer. Click on the cloud on the Stage and delete it. Don’t worry, it’s still on Frame 120, we just don’t want it on this frame. Create a new cloud using the draw tools. You’ll want this cloud on the right side of your screen. Do not group your new cloud. Select Frame 118 of the cloud layer. In the Properties panel, choose Shape from the Tween drop-down menu. Select Angular Blend or Distributed Blend type. Scrub the Timeline to see the results. Cool! The cloud on the right morphs into the cloud on the left.
Reviewing the Basics

We’ll add two other animations to make our movie even more realistic. First, remove part of the runway once the plane is off the ground. Second, bring the house into view. These two activities don’t require any new skills. Instead, they ask you to practice and apply what you learned in this chapter. I’ll provide a graphic showing a suggest approach.

To animate the runway the Classic Motion Tween:
Unlock the runway layer.
Insert a Keyframe in the Timeline at Frame 120.
Drag the runway to the left so only about a half inch is showing.
Select Frame 119 and choose Classic Motion Tween.

To animate the house using the new Motion Tween:
Unlock the house layer.
Insert a Motion Tween on the house layer.
Add Property Keyframes by clicking on the Timeline and moving the house along the grass.
Frame 1 and 120 should look something like the screens below.

Saving and Sharing Your Project

You’ve completed your first Flash animation. Way to go! There are two ways to store and share your project. First, you’ll want to keep a copy of the original document with the .fla file extension. This document can be updated and revised as you come up with other ideas. You can also use it to review your skills later.

Second, you’ll want to export your document to share with others. When your project is ready to upload to a web server, attach to an email, or save on a CD, you’ll want to export the project as a Flash movie with the .swf file extension.

Figure 3-E. Frame 1 and Frame 120.
To save your project as a Flash movie:
Pull down the File menu, choose Export Movie.
Give your movie a short, one word descriptive name.
Notice that the file has a .swf file extension.
Press the Save button.
This Flash movie can now be played by anyone with the Flash
Player installed on their computer.

If the file size of your project seems very large, you may want to reclaim
some space. Try choosing SAVE AS from the File menu rather than SAVE.
Then, give your file a new name. Check the file size, it’s likely that the new
file is much smaller. You may also want to use the SAVE AS option periodi-
cally to save a backup copy of your project.

**Beyond the Basics**

Our first animation works, but it’s not fancy. There are many small
things that you can do spice up your project. You can also refine your skills
and apply them to different situation. Explore a few techniques to expand
your skills:

**Document Properties.** We used the default size for our project (550x400)
and a frame rate of (12fps). However we used 550x100 for our banner. If
you click on the Stage size in the Properties Panel you’ll also be able to add
metadata including a project title and description. You can also change the
background color of your Stage to set a particular mood.

**Templates.** Some people don’t want to take the time to set up their proj-
ects. Flash comes with a few templates for common types of movies. If you
pull down the File menu and choose New, you can click on the Templates
to see the options.
**Printing.** Many options are available for printing. Consider creating simple children’s books using the storyboard printing options. Pull down the File menu and select Print margins for many choices.

![Print Margins dialog box](image)

**Pencil and Pen Tools.** Most pencil tools produce jaggy results. However the Flash pencil allows the user to straighten, smooth, and change the ink.

Choose the Pencil tool and give it a try! Create some waves.

Making curves can be tough unless you have the pen tool. It allows you to create cool lines and Bezier curves.

Choose the Pen tool, click on the start point, middle points, and end point, then double click to end the process. Use the selection tool make adjustments. You can now play with the various points. For a curve, click the start and drag the mouse in the desired direction to start the curve. Move to the desired end point and double-click. The curve made by the pen tool is called a Bezier curve after a French engineer, Pierre Bezier. It’s a curve created from a set of control points. Each point is calculated by control points as parameters.

**Layers.** Once you start creating large projects, you’ll find that dealing with layers can get demanding. Consider organizing your layers into folders. For example, you can create a folder for all your actions, media (i.e., sounds, movies), background items, text elements, etc. They can be organized in whatever way works best for you.

**Movie Clips.** We haven’t spent much time talking about the Movie Clip symbol. If you want to use the same animation a number of times within a project, you may want to create a movie clip. Also, if you want to have animation within animation (called nested), then you may want to use the Movie Clip symbol. For example, we could have many airplanes taking off rather than one. Or, many clouds moving across the sky. Rather than creating many separate airplane or cloud animations, we could just use different instances of a cloud movie clip.

Let’s say you want to have many balloons rising on the screen. If you create a movie clip symbol for one animation, you can reuse different instances of that same movie clip.
Create Your Own Project

Now that you’ve explored the basics of graphics and animation, it’s time to develop your own project. Keep it simple, but try to incorporate the many possibilities discussed in the last two chapters.

If you need an idea, try a hot air balloon project. Create some simple birds and clouds in the sky. Add grass to the ground.

Create a hot air balloon using the graphic tools. Turn it into a Graphic Symbol. Then, make the balloon rise from the ground. Next, create a second hot air balloon with a different color basket and balloon. Animate this balloon. This will give you some practice with motion tweens.

For fun, add some fireworks. Use the shape tween option to create the effect of fireworks exploding.
Create a simple Flash project. Incorporate animation elements into a Flash project.

Be sure to include the following elements: at least 1 text box, at least 1 shape you create in Flash, at least 1 graphic from somewhere else, at least 2 motion tween, at least 1 shape tween, and tweak the animation with motion guide and/or easing.

Save and upload both the .fla and .swf versions.

In addition, write a short project plan to describes the purpose and audience for your animation. In other words, your project should “do” something such as tell a story (i.e., mini-cartoon), provide a greeting (i.e., a greeting card), stimulate inquiry (i.e., ask a question), or advocate a position (i.e., public service announcement).

The following criteria will be used in evaluating your activity:

• Required elements
• Effective, efficient, and appealing project