8 DISTORTING OBJECTS WITH THE PUPPET TOOLS

Lesson overview

In this lesson, you'll learn how to do the following:

- Place Deform pins using the Puppet Pin tool.
- Define areas of overlap using the Puppet Overlap tool.
- Stiffen parts of an image using the Puppet Starch tool.
- Animate the position of Deform pins.
- Record animation using the Puppet Sketch tool.
- Animate facial expressions with Character Animator.

This lesson will take approximately an hour to complete. Download the project files for this lesson, following the instructions in the Getting Started section under "Accessing the lesson files and Web Edition," if you haven't already done so. As you work on this lesson, you'll preserve the start files. If you need to restore the start files, download them from your Account page.

PROJECT: ANIMATED ILLUSTRATION

Pull, squash, stretch, and otherwise deform objects on the screen using the Puppet tools. Whether you're creating realistic animations, fantastic scenarios, or modern art, the Puppet tools will expand your creative freedom.

Getting started

Using the Puppet tools in After Effects, you can add natural motion to raster images and vector graphics. Three tools create pins to define the point of deformation, areas of overlap, and areas that should remain more rigid. An additional tool, the Puppet Sketch tool, lets you record animation in real time. In this lesson, you'll use the Puppet tools to animate a crab's pincers in an advertisement.

Start by previewing the final movie and then setting up the project.

1. Make sure the following files are in the Lessons/Lesson08 folder on your hard disk, or download them from your Account page at www.peachpit.com now:
   - In the Assets folder: crab.psd, text.psd, water_background.mov
   - In the Sample_Movies folder: Lesson08.avi, Lesson08.mov
2. Open and play the Lesson08.avi sample movie in Windows Media Player or the Lesson08.mov sample movie in QuickTime Player to see what you will create in this lesson. When you are done, close Windows Media Player or QuickTime Player. You may delete the sample movies from your hard disk if you have limited storage space.

When you begin this lesson, restore the default application settings for After Effects. See "Restoring default preferences" on page 2.

3. Start After Effects, and then immediately hold down Ctrl+Alt+Shift (Windows) or Command+Option+Shift (Mac OS). When prompted, click OK to delete your preferences. Close the Start window.

After Effects opens to display a blank, untitled project.

4. Choose File > Save As > Save As.
5. In the Save As dialog box, navigate to the Lessons/Lesson08/Finished_Project folder.
6. Name the project **Lesson08_Finished.aep**, and then click Save.

Importing footage

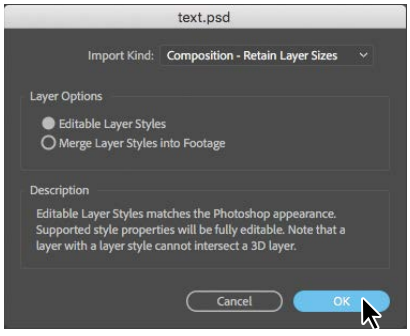
You'll import two Adobe Photoshop files and a background movie.

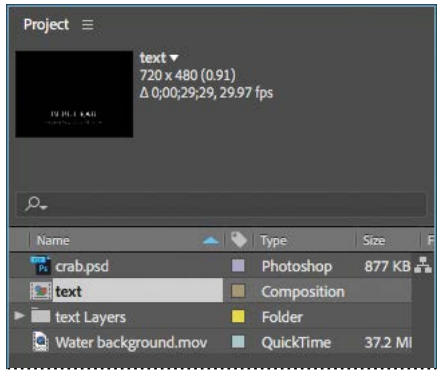
1. Choose File > Import > File.
2. Navigate to the Lessons/Lesson08/Assets folder. Press Ctrl or Command to select the crab.psd and water_background.mov files. Then click Import or Open. The assets appear in the Project panel.

3 Double-click an empty area in the Project panel to open the Import File dialog box again. Select the text.psd file in the Lessons/Lesson08/Assets folder.

4 Choose Composition – Retain Layer Sizes from the Import As menu. (In Mac OS, you may need to click Options to see the Import As menu.) Then click Import or Open.

5 In the Text.psd dialog box, select Editable Layer Styles, and click OK. The imported file is added as a composition to the Project panel; its layers are added in a separate folder.

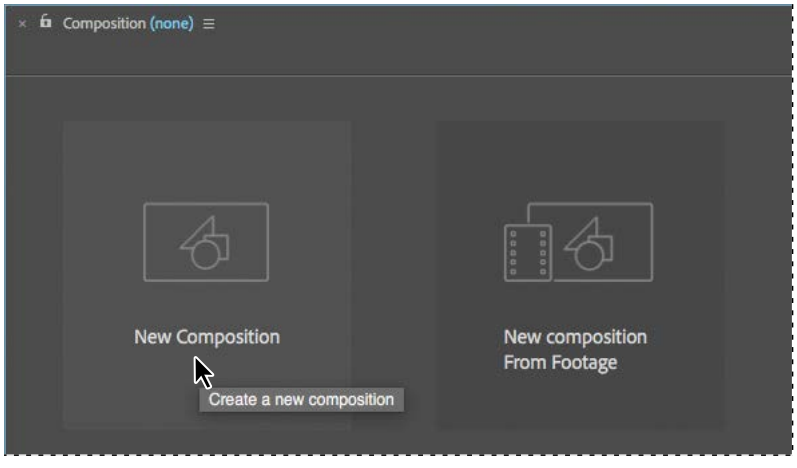




Creating the composition

As with any project, you need to create a new composition.

1 Click New Composition in the Composition panel.

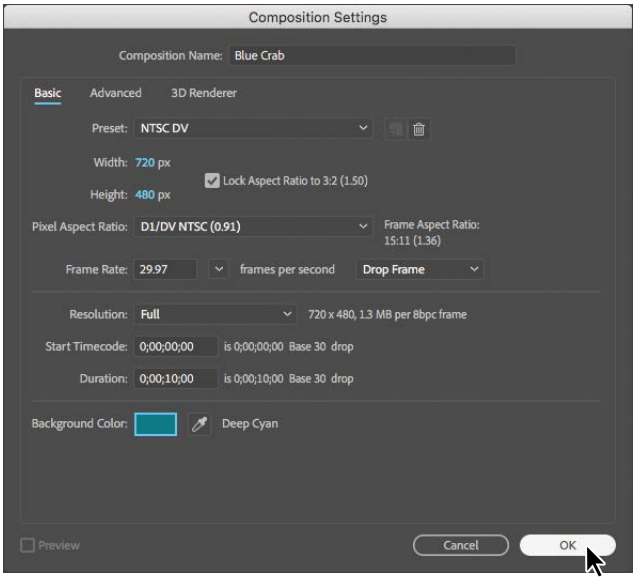


2 Name the composition **Blue Crab**.

3 Choose NTSC DV from the Preset pop-up menu. The preset automatically sets the width, height, pixel aspect ratio, and frame rate for the composition.

4 In the Duration field, type **1000** to specify 10 seconds.

5 Change the Background Color to a deep cyan color. Then click OK to close the New Composition dialog box.



After Effects opens the new composition in the Timeline and Composition panels.

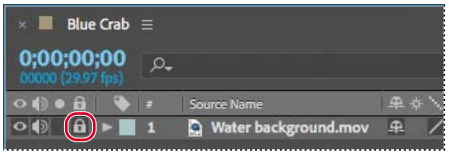
Adding the background

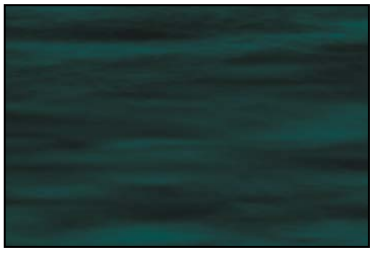
It's easier to animate the image in context, so first you'll add the background to the composition.

1 Press the Home key, or move the current-time indicator to the beginning of the composition.

2 Drag the water_background.mov file to the Timeline panel.

3 Click the Lock icon (🔒) for the layer to prevent accidental changes to it.

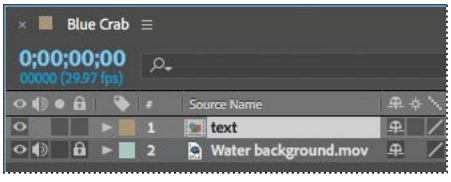




Animating imported text

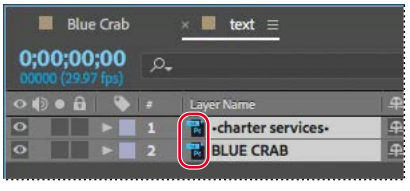
The final movie includes two lines of animated text. Because you imported the text.psd file as a composition with layers intact, you can work on it in its own Timeline panel, editing and animating its layers independently. You'll add an animation preset to each layer.

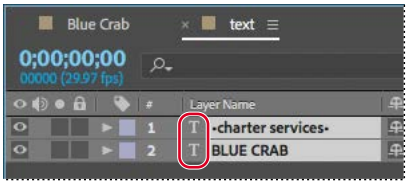
1 Drag the text composition from the Project panel into the Timeline panel, placing it at the top of the layer stack.



2 Double-click the text composition to open it in its own Timeline panel.

3 Shift-click to select both layers in the text Timeline panel, and choose Layer > Convert to Editable Text. (Click OK if you see a warning about missing fonts.)

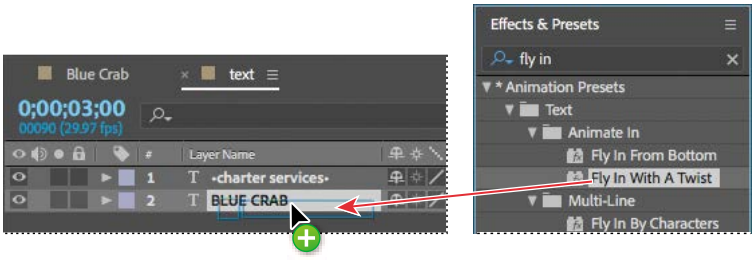




Now the text layers can be edited, so you can apply animation presets.

4 Go to 3:00. Then deselect both layers, and select only the BLUE CRAB layer.

5 In the Effects and Presets panel, search for the Fly In With A Twist animation preset. Then drag it onto the BLUE CRAB layer.



The text will begin to fly in at 3:00 and finish at 5:16. After Effects adds the keyframes for the effect.

6 Go to 5:21, and select the charter services layer.

7 In the Effects and Presets panel, search for the Slow Fade On animation preset. Then drag it onto the charter services layer.

8 Return to the Blue Crab Timeline panel, and move the current-time indicator to the beginning of the time ruler. Press the spacebar to preview the animation. Press the spacebar again to stop playback.

9 Choose File > Save to save your work so far.

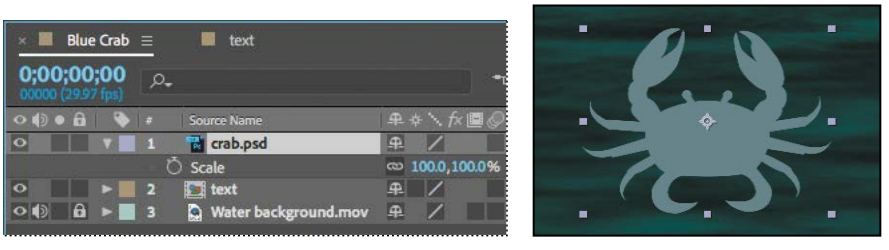
Scaling an object

Next, you'll add the crab. You'll animate it so that it fills the screen at the beginning of the movie, then quickly shrinks and moves into position above the area where the text will appear.

1 Drag the crab.psd file from the Project panel to the top layer in the Timeline panel.

2 Press the Home key to move the current-time indicator to the beginning of the time ruler.

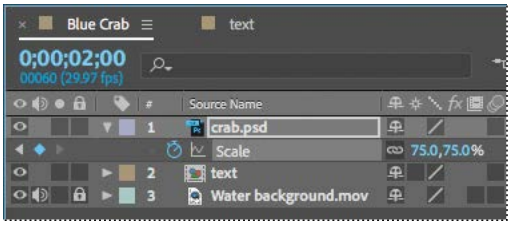
3 Select the crab.psd layer in the Timeline panel, and press S to display its Scale property.

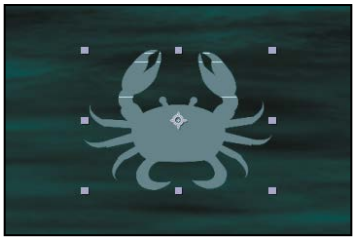


4 Change the Scale value to **400%**.

5 Click the stopwatch icon (⏱) next to Scale to create an initial keyframe.

6 Move to 2:00, and change the Scale to **75%**.





The crab will scale appropriately, but its position isn't quite right.

7 Press the Home key to return to the beginning of the time ruler.

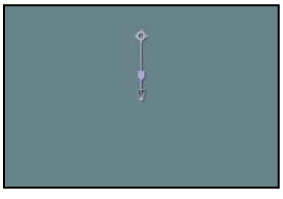
8 Press P to display the layer's Position property, and change the Position to **360**, **82**. The crab moves up to fill the composition.

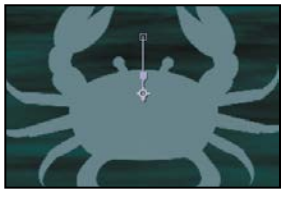
9 Click the stopwatch icon next to Position to create an initial keyframe.

10 Go to 1:15, and change the Position to **360, 228**.

11 Go to 2:00, and change the Position to **360,182**.

12 Drag the current-time indicator across the first two seconds of the time ruler to see the crab animation.





13 Hide the properties for the crab.psd layer, and choose File > Save.

About the Puppet tools

The Puppet tools turn raster and vector images into virtual marionettes. When you move the string of a marionette, the body part attached to that string moves; pull the string attached to the hand, and the hand goes up. The Puppet tools use pins to indicate where strings would be attached.

The Puppet effect deforms parts of an image based on the positions of pins that you place and animate. These pins determine which parts of the image should move, which parts should remain rigid, and which parts should be in front when areas overlap.

There are three kinds of pins, each placed by a different tool:

- The Puppet Pin tool () places and moves Deform pins, which deform a layer.
- The Puppet Overlap tool () places Overlap pins, which indicate the parts of an image that should be in the front when areas overlap.
- The Puppet Starch tool () places Starch pins, which stiffen parts of the image so that they are distorted less.

Note: The mesh is calculated at the frame where the Deform pins are applied. If you add more pins anywhere in the timeline, they are placed based on the original position of the mesh.

As soon as you place a pin, the area within an outline is automatically divided into a mesh of triangles. Each part of the mesh is associated with the pixels of the image, so as the mesh moves, so do the pixels. When you animate a Deform pin, the mesh deforms more in the area closest to the pin, while keeping the overall shape as rigid as possible. For example, if you animate a pin in a character's hand, the hand and arm will be deformed, but most of the character will remain in place.

Adding Deform pins

Deform pins are the main component of the Puppet effect. Where you place these pins and how you position them determine how the objects move on the screen. You'll place Deform pins and display the mesh that After Effects creates to determine the area of influence for each pin.

When you select the Puppet Pin tool, the Tools panel displays the Puppet tool options. Each pin has its own properties in the Timeline panel, and After Effects automatically creates an initial keyframe for each pin.

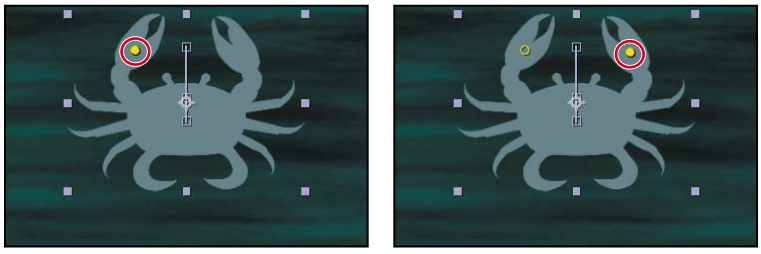
1 Select the Puppet Pin tool () in the Tools panel.

2 Go to 1:27, just before the crab scales down to its final size.

3 In the Composition panel, place a Deform pin of the crab's left pincer.

A yellow dot representing the Deform pin appears in the Composition panel. If at this point you were to use the Selection tool () to move the Deform pin, the entire crab would move with it. You need more pins to keep the other parts of the mesh in place.

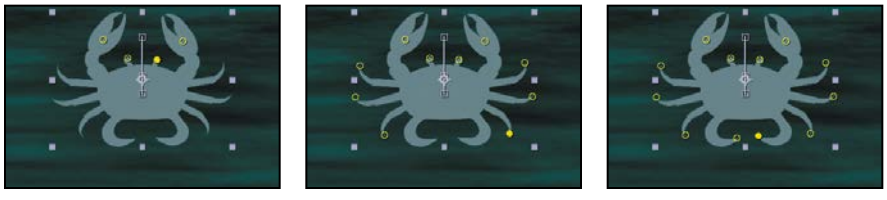
4 Using the Puppet Pin tool, place another Deform pin in the middle of the right pincer.



Now you can move a pincer with the Selection tool. The more pins you place, the smaller the area of influence for each pin, and the less each area will stretch.

5 Select the Selection tool (▶), and drag one of the Deform pins to see its effect. Then return it to its original position by pressing Ctrl+Z (Windows) or Command+Z (Mac OS).

6 Place additional Deform pins at the top of each antenna, at the end of each side leg, and at the tip of each of the crab's swimming legs.

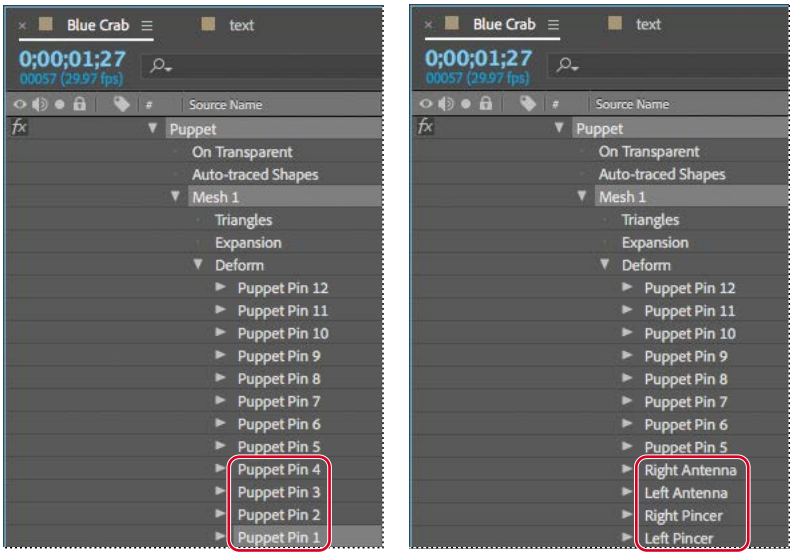


7 In the Timeline panel, expand the Mesh 1 > Deform properties. Each Deform pin is listed.

Depending on the type of animation you're performing, you may want to name the pins. In this case, you'll name just the pincer and antenna pins.

8 Select Puppet Pin 1, press Enter or Return, and rename the pin **Left Pincer**. Press Enter or Return again to accept the new name.

9 Rename the corresponding pins **Right Pincer**, **Left Antenna**, and **Right Antenna.** Which pins you rename depends on the order in which you placed them. You do not need to name the pins on the legs unless you want to.



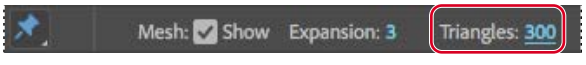
10 Select Show in the options section of the Tools panel to display the distortion mesh.

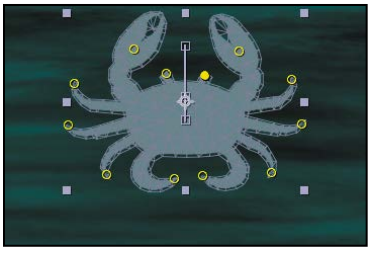
The crab is nearly the same color as the triangles in the mesh, so you'll need to look closely to see the mesh.

▶ **Tip:** You can extend the mesh beyond the outline of the layer in order to ensure a stroke is included in the deformation. To expand the mesh, increase the Expansion property in the options section of the Tools panel.

11 Change the Triangles value in the options section of the Tools panel to **300**.

The Triangles setting determines how many triangles are included in the mesh. Increasing the number of triangles results in a smoother animation, but also increases rendering time.

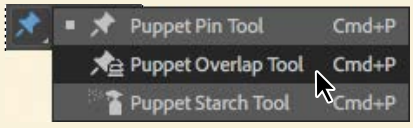




12 Choose File > Save to save your work so far.

Defining areas of overlap

If your animation requires part of the object or character to pass in front of another, use the Puppet Overlap tool to define the areas that should appear in front when areas overlap. Select the Puppet Overlap tool, which is hidden behind the Puppet Pin tool in the Tools panel, click Show to display the mesh, and then click intersections in the mesh to place Overlap pins in the areas that should always remain in front.

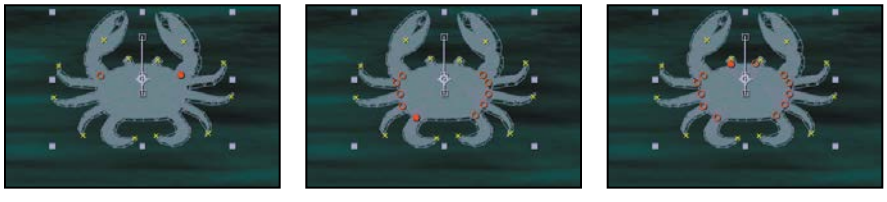


You can adjust the effect of the Overlap pins in the optoins area of the Tools panel. The In Front value determines the apparent proximity to the viewer; setting the value to 100% prevents those parts of the body that are overlapped from showing through. The Extent value determines how far the overlap influence extends for the pin; the affected area appears lighter in the Composition panel.

Stiffening an area

The pincers, legs, and antennae of the crab will move in the animation, but the carapace should stay firm. You'll use the Puppet Starch tool to add Starch pins to ensure the carapace isn't affected by the pins' movements.

1. Select the Puppet Starch tool (), which is hidden behind the Puppet Pin tool in the Tools panel.
2. Select Show in the options area of the Tools panel to display the distortion mesh.
3. Place Starch pins at the base of each pincer, leg, and antenna to stiffen the entire carapace, as in the image below.



4. Hide the properties for the crab.psd layer in the Timeline panel.
5. Choose File > Save to save your work so far.

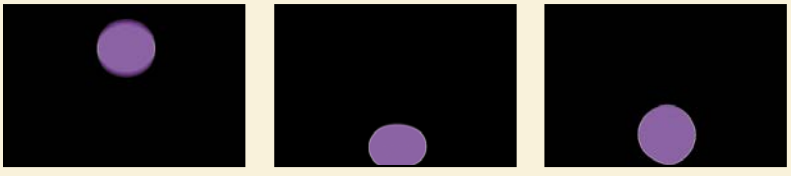
Note: The Amount value determines how rigid the area will be. Typically, a low value is fine; higher values make the area more rigid. You can also use negative numbers to reduce the rigidity of another pin.

Note: You must select the Show option separately for each Puppet tool. You can also place pins without viewing the mesh.

Squash and stretch

Squash and stretch is a traditional animation technique that adds realism and weight to objects. It's an exaggeration of the effect that occurs in real life when a moving object comes into contact with a stationary object, such as the ground. When squashing and stretching are applied correctly, the volume of the character doesn't change. If you use the Puppet tools to animate cartoon characters or similar objects, consider how they interact with other objects.

The easiest way to understand the principle of squash and stretch is to view an animation of a bouncing ball. As the ball lands, it partially flattens, or squashes. As it bounces up, it stretches.

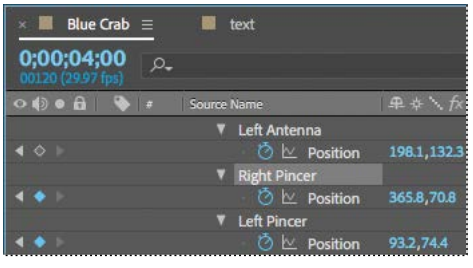


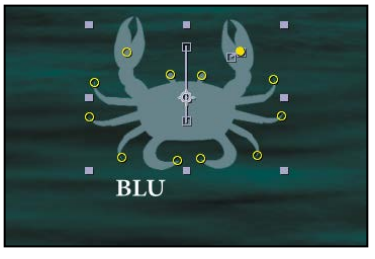
Animating pin positions

The Deform and Starch pins are in place. Now you can change the Deform pin positions to animate the crab. The Starch pins keep specific areas (in this case, the carapace) from moving too much.

When you placed the pins, After Effects created initial keyframes for each pin at 1:27. You'll animate the pins so that the crab waves its pincers, legs, and antennae, and then returns to its original position.

1. Select the crab.psd layer in the Timeline panel, and then press U to display all the keyframes for the layer.
2. Go to 4:00, and then move the pins in both pincers so that they're almost vertical.





3 Go to 5:00, and move the Left Pincer and Right Pincer pins so that the pincers are further apart.

4 At 6:19, turn the pincers back inward. Then, at 8:19, position them so that they're roughly vertical again. At 9:29, move the pincers so that they're fully turned inward.

5 Move the current-time indicator across the time ruler to see the pincers wave.

Next, you'll move the antennae closer together. The first keyframe already exists, so you need only to create one more.

6 Go to 7:14, and pull the pins on the antennae closer to each other.

Now you can animate all the legs. You want them to start moving even before the pincers do, and they should wave around a bit.

8 Go to 1:19, and move the pin on each leg so that each leg is slightly longer and curved outward.

9 Make changes to each leg at 2:01, 4:00, 6:17, and 8:10 so that the legs move slightly upward or downward, in and out as the video progresses. Move each pin about the same amount each time, in whatever direction you choose.

10 Press F2 or click an empty area of the Timeline panel to deselect all layers. Then, press the Home key or move the current-time indicator to the beginning of the time ruler.

11 Press the spacebar to preview your animation. Press the spacebar again to stop playback. If you want to change the animation, adjust pins at each keyframe.

11 Choose File > Save to save your animation.

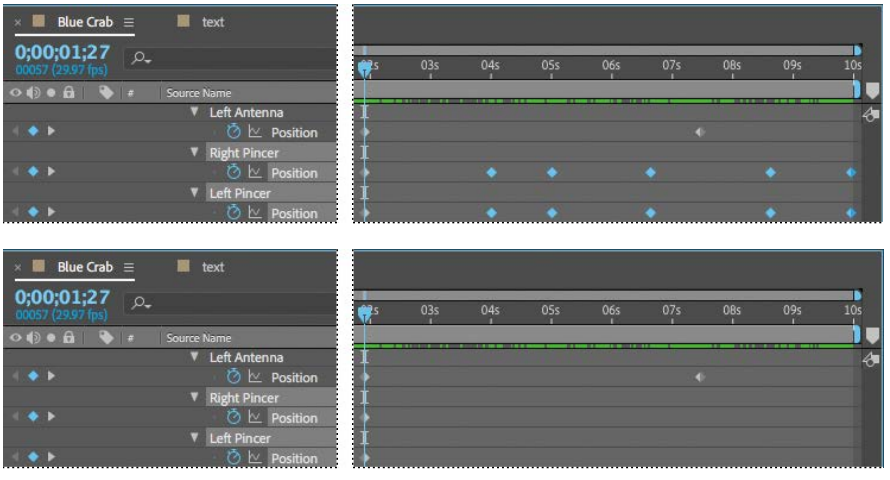
Recording animation

Changing the position of each pin at each keyframe worked, but you probably found the process to be slow and tedious. Instead of manually animating keyframes, you can use the Puppet Sketch tool to drag the pins into position in real time. After Effects starts recording the motion as soon as you begin dragging a pin, and it stops recording when you release the mouse button. The composition moves forward through time as you move the pin. When you stop recording, the current-time indicator returns to the point at which you began recording, so that you can record the path for another pin during the same time period.

Experiment with this method of animation as you re-create the pincers' movement using the Puppet Sketch tool.

Tip: By default, the motion is played back at the speed at which it was recorded. To change the ratio of recording speed to playback speed, click Record Options in the Tools panel, and change the Speed value before recording.

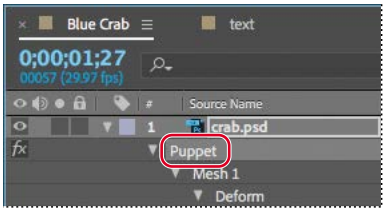
1. Choose File > Save As > Save As, and name the project **Motionsketch.aep**. Save it in the Lesson08/Finished_Project folder.
2. Move the current-time indicator to 1:27.
3. In the Timeline panel, select the crab.psd layer and press U to display all the keyframes for the layer.
4. Scroll down to the Left Pincer and Right Pincer pins. Drag to select all keyframes for those pins after 2:08, and then delete the keyframes.

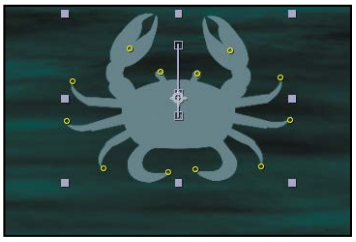


The animation for the other pins remains, but you've removed the keyframes that animate the pincers. Depending on where you placed Starch pins, the pincers may move slightly in response to other pins' movements.

5 Select the Puppet Pin tool (📌) in the Tools panel.

6 In the Timeline panel, select Puppet to see the pins in the Composition panel.

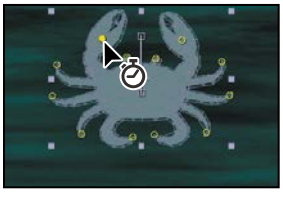




7 Select a pin in the Composition panel, and press Ctrl (Windows) or Command (Mac OS) to activate the Puppet Sketch tool. (A clock icon appears next to the pointer).

8 Continue to hold down Ctrl or Command as you drag the Left Pincer pin into different positions for the length of the video. Release the mouse button when you've finished. The current-time indicator returns to 1:27.

9 Press Ctrl or Command, and drag the Right Pincer pin into different positions. Use the outline of the crab and the other pincer's movements to guide you. Release the mouse button to stop recording.



10 Preview the final animation.

You've used the Puppet tools to create a realistic, engaging animation. Remember that you can use the Puppet tools to deform and manipulate many kinds of objects.

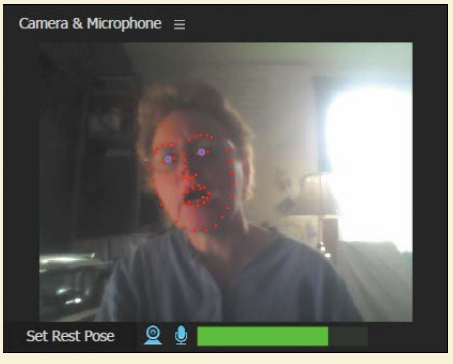
Act it out with Adobe Character Animator

If you identify strongly with your characters, you might want to use Adobe Character Animator instead of creating cumbersome keyframes. It's especially useful if you're creating a long scene or you need to match the character's mouth to speech. It's also a lot of fun.

Character Animator is included in an Adobe Creative Cloud membership. With it, you can import a character you've created in Photoshop or Illustrator, and then act out facial gestures and head movements in front of your webcam; your character mirrors your gestures on the screen. If you speak, the character's mouth moves to match your words.

You can move other body parts, such as legs and arms, using keyboard shortcuts or your mouse or tablet. And you can set up dangling behavior so that, for example, if a rabbit's head moves to the left, its ears dangle with it.

Character Animator includes some entertaining interactive tutorials to help you get started. To learn more, go to https://www.adobe.com/products/character-animator.html.



Tips for a smooth animation experience:

- Create different layers for different moving parts: draw the mouth on one layer, the right eye on another, and so on.
- Name layers so Character Animator will recognize them. Certain words, such as "pupil," help map the character to the image in the camera.
- Practice facial and other gestures before recording. Once you've set your Rest Pose, try different mouth shapes, eyebrow raises, head waggles, and other movements to see how subtle or exaggerated movements translate for your character.
- Speak into the microphone as you record. Many mouth shapes are triggered by audio cues, such as "uh-oh," and the character's mouth movements will be synced to your words automatically.
- Especially at first, consider using an existing character file as a template. It'll be easier to get the layer names right.
- Try animating objects that don't have faces and bodies. For example, you can use Character Animator to animate clouds floating, a flag waving, or flowers opening. Be creative and have fun!

Review questions

1. What's the difference between the Puppet Pin tool and the Puppet Overlap tool?
2. When would you use the Puppet Starch tool?
3. Describe two methods of animating pin positions.

Review answers

1. The Puppet Pin tool creates Deform pins, which define the position of a portion of the image as the image is deformed. The Puppet Overlap tool creates Overlap pins, which determine which areas of an object remain in front when two areas overlap.
2. Use the Puppet Starch tool to add Starch pins to an area that you want to remain more rigid while other areas of the object are distorted.
3. You can manually animate pin positions by changing the position for each pin in the Timeline panel. To animate pin positions more quickly, use the Puppet Sketch tool: With the Puppet Pin tool selected, press Ctrl or Command, and drag a pin to record its movement.