

1A.3: Seeing the Principles of Animation at Work

1. Show students a movie clip.

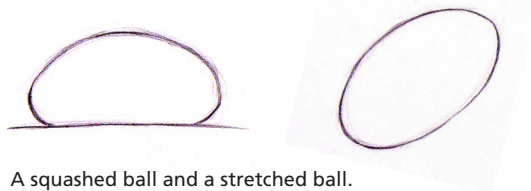
Tell students that now they will learn more about the basic principles of animation. Give students **Handout 3: Principles of Animation #1**.

Play students one of the short movie clips that demonstrate the principles of animation. As students watch, highlight the characteristics of *squash and stretch*, *slow in* and *slow out*, *arcs*, and *timing*.

Teacher's Notes: Demonstrating Analysis of an Animation Principle

To highlight the use of these four principles, you can pause the clip, play it in slow motion at key moments, or use a dry-erase marker to sketch on the monitor. (If you can't use a dry-erase marker on your monitor, you can project the clip onto a white board or tracing paper and draw on those surfaces.)

- **To illustrate squash and stretch**, trace an object or body part squashing and then trace it stretching a few frames later.



A squashed ball and a stretched ball.
Drawings by Brock Ramirez.

- **To illustrate slow in and slow out**, play the clip in slow motion to point out that, for example, a bouncing object moves more slowly near the top of the bounce. You can explain that this principle also refers to the fact that humans and animals (unlike machines or robots) do not “snap” into position; rather, we ease in and out of positions. Slow in and slow out keeps a character's motions from looking too abrupt.

Note: It may be easier for students to identify this principle if you choose clips that show characters making big gestures or motions.

- **To show arcs**, draw points, frame by frame, showing a character's wrist or other body part as the character walks or moves. Then connect the points to show that there is an arc to the movement of the body part.
- **To demonstrate timing**, play the clip in slow motion and point out how different timing is used for certain objects and characters—for example, a heavy character might move more slowly than a lighter character.

Teacher's Notes: Sample Analysis of Sleeping Beauty

The following is an analysis of a four-minute clip from *Sleeping Beauty*, starting about eight minutes into the movie (when Maleficent appears in the castle):

- *Squash and Stretch*: The faces of the knights stretch as they recoil in surprise from Maleficent (9:35); the king's face squashes and stretches when he asks, "Then, she can undo this fearful curse?" (9:52); the faces and the fabric-covered bodies of the fairies squash and stretch throughout, sometimes subtly and sometimes more broadly; Merryweather's face and body squash and stretch dramatically when she says the word "hop-toad" near the end of the clip (11:43).
- *Slow In and Slow Out*: There are examples of this principle throughout, when characters move, but students may be able to see it most clearly when looking at Maleficent, whose movements are slightly slowed down and exaggerated for effect. Slow in and slow out is also clearly used when Flora (the fairy dressed in red) tells the king and queen not to despair (9:47).
- *Arcs*: Examples of arcs can be seen throughout the clip when characters move. One particularly clear example is when Maleficent raises and lowers her arms as she says, "Listen well, all of you" (9:00). Maleficent's hand movements, in general, move in clear arcs.
- *Timing*: The characters in the clip have different timing (move more slowly or quickly) that depends on their bodies, their personalities, and the action in the clip. For example, Maleficent moves relatively slowly and in a slightly exaggerated manner, appropriate for her status as a powerful magical being (and one who is pretending to be civil while actually being threatening). On the other hand, the fairies generally move more quickly (particularly their heads and hands) and with a "bouncy" motion befitting their size and personalities. The king and queen generally move more slowly and regally, but the queen moves quickly to pick up Aurora when she is threatened by Maleficent, and the King moves quickly to tell the guards to seize Maleficent.

2. Have pairs analyze the use of one animation principle in a movie clip.

Pair students and assign each pair one of the principles of animation from Handout 3.

Give students a few minutes to read the information about their assigned principle and then play the second short movie clip. Tell students that as they watch the clip, they should take notes on the following questions:

- How do the animators make use of the principle during this clip?
- What visual evidence can you point to? Make note of at least one specific moment during the clip.

Have students write their notes on Handout 3. If necessary, play the clip twice so that students can complete their analyses.

Give pairs a few minutes to discuss their analyses, come to a consensus about the use of the principle in the clip, and select one moment during the clip to use as evidence.

3. Have students share their analyses.

Have several pairs of students explain how the animators made use of their assigned principle. Cue the clip to the moment the pair has chosen and, if appropriate, have students sketch on the monitor with dry-erase markers to identify the visual evidence.

Once pairs have shared their analyses, ask:

- How does the use of these principles affect the animation?
Possible answers: Use of the principles of animation makes the animation more alive or believable for the viewers, engaging to watch, and visually appealing.
- How do you think using these principles supports the telling of the story?
Possible answers: By making the world of the story seem more real and believable to viewers; by focusing the scene on the characters and action.



Handout 3: Principles of Animation #1

As with most other art forms, animation has a set of basic principles. Ollie Johnston and Frank Thomas, animators who worked for Disney, laid out 12 principles of animation in their book *The Illusion of Life: Disney Animation*.

These 12 principles incorporate the techniques that Disney animators used to create more lifelike, believable animations. Although the technology has changed since Walt Disney began making animations in the 1920s, these same principles still apply.

Below is a description of four of these principles. (You'll learn about the others later in the unit.) Your teacher will assign you and a partner one principle. Take notes on how the principle is used as you watch an animated movie clip.

Squash and Stretch



A squashed ball.
Drawing by Brock Ramirez.

Think about a rubber ball bouncing on the ground. When the ball hits the ground, does it stay exactly the same shape? Although it happens so quickly you may not notice it, the ball “squashes” a little bit, compressing as it makes contact with the ground. Like the ball, many things in the world—both inanimate objects and living things, such as people and animals—change shape as they move in response to physical forces.



A stretched ball.
Drawing by Brock Ramirez.

Animators represent these physical changes by squashing and/or stretching the shapes of objects and characters as they move. Too much squashing and stretching can make the animation seem rubbery, while too little can make it seem wooden. It's important to know that when you use the squash-and-stretch principle, the volume of the object remains the same. That is, even though the ball changes shape when it hits the ground, its total size doesn't change.

Notes:





Slow In and Slow Out

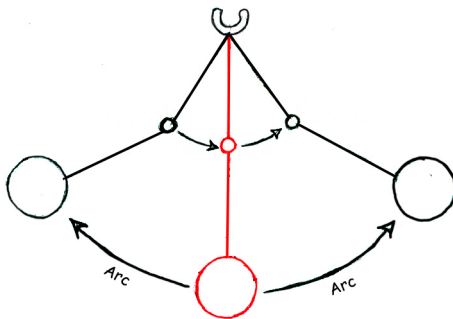
Think back to the penny animations that you created. In the second animation, the penny moved more slowly at the beginning and at the end of the bounce. This is one version of the principle of *slow in and slow out*—putting more frames at the beginning and the end of an action to make the movement appear slower at those times.

This principle is important because objects and people usually take some time to start and to stop moving and because the audience usually needs time to register the action taking place. *Slow in and slow out* can also keep animations from looking too robotic. However, as with most of these principles, you will find exceptions (i.e., there are some situations where it's better to have the action begin or end quickly).

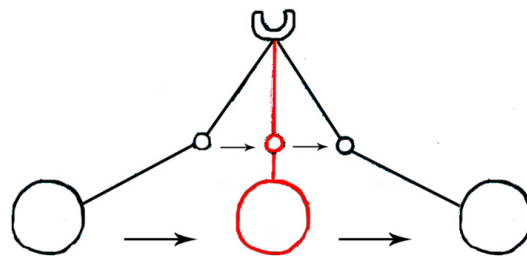
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Arcs

Think about the trajectory (or path) of a bouncing ball, or the arm of a baseball pitcher as it moves forward to deliver a pitch. Do these objects move in a straight line? Of course not! They move in arcs. Almost all natural movement takes place on a curved or circular path, as seen here in the picture of the pendulum swinging. Animators following this principle make sure that the movements in their animations follow these natural arcing paths. The exception is mechanical movement, such as that made by machines or robots.



Drawings by Brock Ramirez



Wrong! The ropes shrink! Although this is an extreme example, similar problems commonly occur to varying degrees in animations that are not mindful of arcs of motion.

Notes:





Timing

You already learned something about timing when you animated a penny. *Timing* refers to how quickly or slowly an action happens—for example, the length of time it takes for a ball to bounce. Appropriate timing can make an animation look more realistic—for example, a heavier object may take longer to begin moving and to stop moving than a lighter object would, just as in real life.

Timing also affects the pacing of a scene—if there are too many slow actions, a scene can drag or become boring (although there may be instances when an animator intentionally slows down a scene).

Timing can be affected by such factors as how much an object weighs and its placement in a scene. Timing can also be affected by a character's personality and body type (for example, a large man deep in thought will usually move more slowly than an excited young boy). During the animation process, timing is affected by spacing—the more closely spaced an object is from one frame to the next, and the more drawings there are of the object completing an action, the more slowly the object will seem to move.

How might the timing be different for these two characters, based on their body types?
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Notes:

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