2

Chapter Contents

- The Principles of Animation using Anime Studio
- Animation as a Career
- Character Design

Principles and Essential Concepts of Animation

Animation as we know it has been around since Horner invented the zoetrope in 1834. Since then animators have developed a set of rules and principles that help us to draw viewers into the world we have created-Animation. This chapter will tap the 12 key techniques you need to master to be a top-flight animator.

The Principles of Animation using Anime Studio ------→ Lesson 5

Animation has defined its own principles over the years. Although most of these principles emerged from the traditional 2D world of animation, most definitions, terminologies, and principles of movement can be applied to all of animation's disciplines. Many of these principles will be covered in detail and more specifically in the sections on 2D and 3D animation, but here is an overview of elements and factors of both.

Squash and Stretch(Principle 1)

Squash and Stretch is a commonly used animation principle applied to moving shapes or characters. It is seen when an object's shape is changed or exaggerated to create more fluid, realistic-looking motion. Squash and Stretch also serves to give the viewer an impression of what the object is made of. For example, more squashing and stretching looks rubbery, organic and flexible (like a living being); less squashing and stretching appears hard and inflexible (like a bowling ball).

One general rule with Squash and Stretch is to change an object's shape without changing its volume. This allows the animator to add flexibility to the animation and allows a character to move to more extreme positions.

How to : Squash and Stretch

In this principle, the animator will create a bouncing ball then the ball squashes when it hits the ground and stretches as it bounces in the air. Keep in mind that when animating a ball, the weight of the ball is important, since it defines how high a ball will bounce and how much it will squash. Below are the directions to accomplished this principle.

- First, set the main key poses: where the ball will start, where it collides with the ground, and where it will end.
- Next, add in breakdowns to shape the arcs and define the path of the bouncing ball.
- Thirdly, add squashes and stretches to further enhance the way the ball responds to collisions and going up in the air.
- Finally, add rotations to correspond with the angles of the arcs in the path.
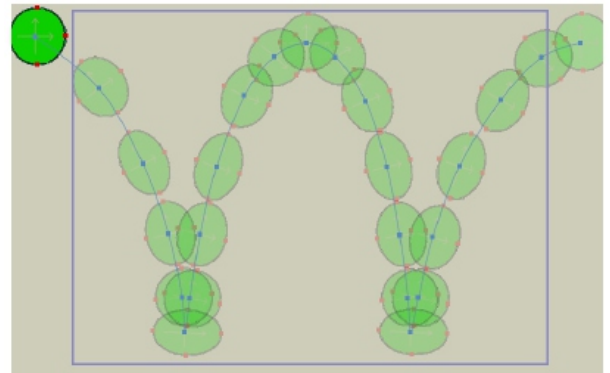
Exaggeration (Principle 2)

The principle of exaggeration is used to gather interest and excitement for your animation and connect with your audience. This is accomplished by embellishing actions and emotions beyond their realistic levels—helping to draw attention to the main parts of an animation.

A common use of this principle is to exaggerate emotions, which helps connect with the audience. For example, if a character is tired, show how exhausted he is by having him yawn excessively. If a character is angry, change his facial expression to make him look furious, and make his face redden.

Balancing the use of exaggeration in an animation is key. You don't want to add exaggeration to all elements in your animation, since it will make the animation seem unrealistic. Using too much exaggeration can also make it difficult to draw attention to certain objects, since the audience won't understand what you want them to focus on. On the other hand, adding exaggeration to just one object in the scene may make the overall animation appear lifeless and unrealistic to the audience.

Also, please note that exaggeration is often used with squash and stretch. For example, a character may cross a puddle of water and stretch his legs excessively to make it across the puddle without getting wet.

How to : Exaggeration

A simple way to show exaggeration of an object is with a brick. In this principle the animator will animate a brick teetering on the top of a building, then falling down and bouncing. Exaggeration makes the brick teeter longer than it would in real life, adding some suspense to the animation.
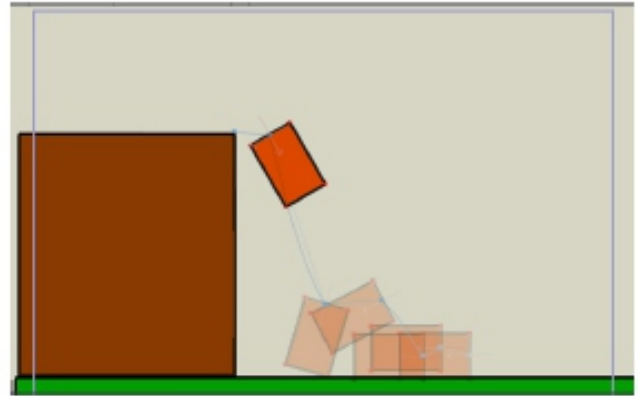
Anticipation (Principle 3)

The Principle of Anticipation is used when preparing for an action or when taking needed movements to complete an action. Anticipation creates expectation and realism in your animation, helping to alert the audience that something is about to happen or has just happened.

For example, when a baseball player hits a ball with his bat, he must first hold the bat up behind him, getting ready for the ball that will be thrown to him. In the same vein, the pitcher will 'wind up' before he throws the ball—bringing his arm behind him and taking his leg off the ground before he completes the pitch.

Another example would be when a character walks down the street, hears a loud sound and rapidly turns his head from left to right to anticipate the next action, such as a car racing down the street past the character.

Anticipation can also be used to demonstrate weight or mass. For example, a character might bend its knees and lean back while carrying a heavy object.

How to : Anticipation

In this principle, the animator will animate a simple character that anticipates and reacts to a pebble falling from the sky. It consists of three levels of animation:

- A rock will fall from the sky to the ground and bounce a few times. (Because rocks are solid, there won't be any squash and stretch, and the bounces will be small.)
- The character reacts to the object, demonstrating anticipation through the character's eye expressions. Here the character acknowledges that the rock has fallen and anticipates where it will end up with different eye movements.
- The final level of animation is the character picking up the rock.
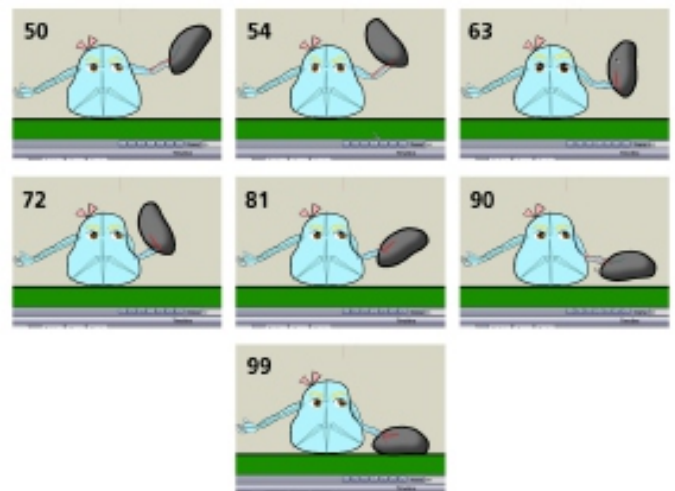
Secondary Action (Principle 4)

Secondary action is used when creating additional movements that exist outside the main action in the scene. It helps support the main action by enhancing it with complementary movements. For example, if your animation's main action is a girl running, her ponytail may swing along behind her, she may take out a music player and switch the song, or she may look at her watch. These additional actions almost always are happening outside the main action.

There may also be secondary actions that exist outside the character, such as a background movement, additional characters moving or other subtle actions. For example, clouds may drift by in the sky or a mountain range could slowly pass through the background, showing movement. Other movements such as birds flying, a leaf falling from a tree or the wind blowing through the trees in the background can all be types of secondary action.

How to : Secondary in Action

In this principle the animator will animate the clouds in the background of the scene you created in the previous principle (anticipation) as a form of secondary action. Then add some sky and three layers of background clouds. Each of the cloud layers will animate at a different speed.

As mentioned above, animating the clouds is a good example of secondary action, since they add subtle background movements that help set the overall feeling of the scene.
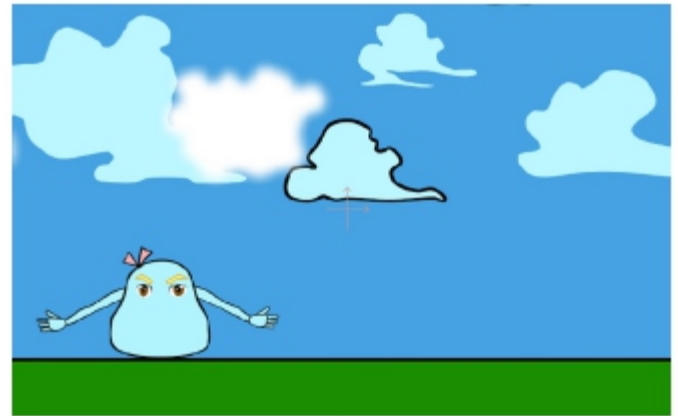
## Follow-Through and Overlapping (Principle 5)

Follow-Through is the continued, full progression of movement seen in body parts and other appendages during an action, as well as after an action has ended. For instance, when an arm swings while a character is walking, the top of the arm moves first, followed by a bend of the elbow, then a bend of the wrist and finally the hand. Another common example of follow-through would be when a tennis player holds the tennis racket back with his arm to hit the ball, then follows through with his arm to complete the swing.

Overlapping is seen when body parts and other appendages cross each other and move in cycles. Overlapping enables you to make an animation appear more fluid. Animating a walking character step-by-step (also known as a walk cycle) is a good example of an overlapping action since when a character walks, his feet cross each other. This could also be seen if a character was climbing a ladder or kicking his legs in a pool.

How to : Follow-Through and Overlapping

In this principle a good sample project is to create a walk cycle with a character in the Anime Studio.

The walk cycle incorporates both overlapping and follow-through, since when the character is walking, both arms and legs cross each other (displaying overlapping), and his appendages will show a full progression of movement (displaying follow-through).
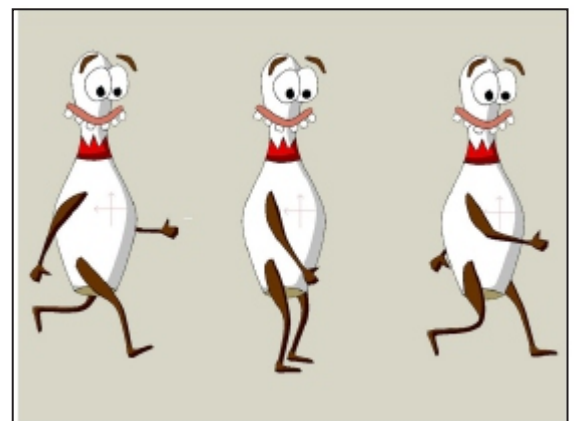
Ease-In and Ease-Out (Principle 6)

Ease-in and ease-out (also referred to as "slow-in and slow-out") is a transition principle that is demonstrated when a character or object moves between extreme poses. Ease-in and ease-out makes animation appear more realistic by placing keyframes closer together or further apart at transitional movements to create the illusion of an object speeding up or slowing down.

For example, a jumping frog speeds up when it leaves the ground (ease out), then slows as it rounds the top of its jump (eases in) and speeds up again as it heads back toward the ground (eases out). It also moves through extreme body movements as this is happening, since its body is crouched together at the bottom of the jump and stretched out when it's in the air.

How to : Ease-In and Ease-Out

To show how this principle is observed and done, the animator will animate a character swinging back-and-forth on a swing, also known as a "swing cycle" in animation. To make this easier to achieve we'll use a ready-made character that is already positioned on a swing.

A swing cycle is a good way to demonstrate ease-in and ease-out, because the character's movement eases in, accelerating as he swings toward the ground and eases out, slowing as he changes position. Anime Studio includes an Ease-In and Ease-Out feature that will help you accomplish this movement.
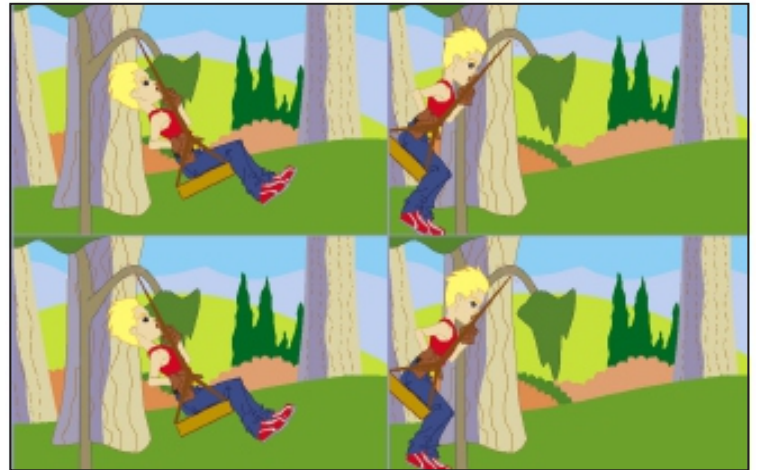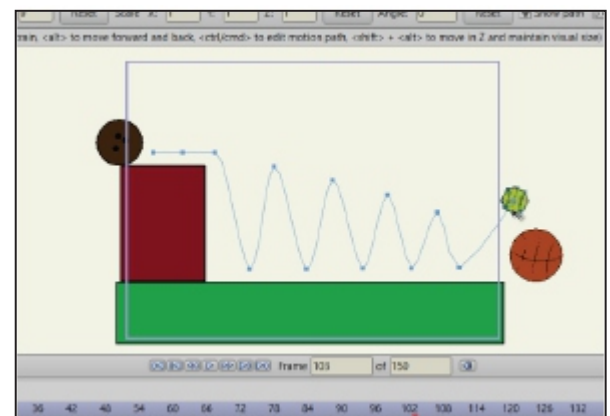

Arcs   (Principle 7)

Almost all actions tend to follow an arc or circular path. Arcs occur for one of two reasons: because a limb or appendage is rotating around a joint or because of gravity (if you throw an object forward, gravity pushes it down causing an arc). This is especially true with living beings such as humans and animals and should be recreated in animation to help produce realism. For instance, when a frog jumps it follows a curved path—starting when it leaves the ground, to the top of the jump, then back to the earth.

One great example of arcs caused by gravity can be seen with Lesson 1's bouncing ball (shown here). When the ball hits the ground, it curves up to the top of the bounce before it moves back toward the ground. The ball is moving forward and gravity pushes it toward the ground, causing it to follow a rounded path.

How to : Arcs

To illustrate this principle, the animator will create an animation using balls that bounces using arcs. There are three different types of balls in this illustration, so you can see how objects with different weights and volumes follow different paths.

By default, Anime Studio creates smooth arcs of motion when you change an object's direction of movement with the Transform Layer tool. As you create the ball bounces in this lesson, notice how the curvature of the arc changes depending how tight or high the balls' bounces are.

Appeal (Principle 8)

Appeal makes a character appear more realistic to the audience, very similar to how a good actor has charisma. This principle aims to bring out a character's personality and applies to all types of characters, including villains, heroes and everything in between. Appeal is used to manifest the audience's attraction to a character or animation, helping your audience relate to and find empathy for your character.

Appeal is created in a variety of ways and includes clean design and solidly drawn, well-constructed characters. It is also created through facial expressions and body movements, which help create magnetic personalities to bring characters to life. And finally, appeal is created through well-developed story lines that connect to the audience both visually and emotionally.

How to : Appeal

The principle appeal is very fun to study, animator create appeal by using Switch Layers to animate a character's facial expressions with the eyes and the mouth, helping to capture the audience's attention. You'll be able to experiment with different facial expressions to see how they change the appeal of the animation.
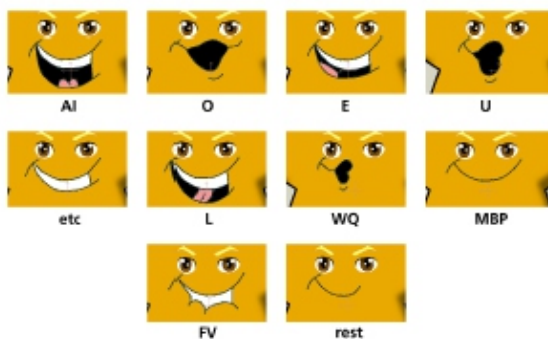
Switch Layers in Anime Studio allow users to easily create lip-synced animations. Lip syncing adds appeal to characters because it helps their speech appear more realistic and believable and helps bring the character to life.

Straight-Ahead and Pose-to-Pose Animation (Principle 9)

Straight-ahead and pose-to-pose describe two different ways to draw animations. Most animators use a combination of these two techniques.

- Straight-Ahead: A traditional way of animating a character. Each frame is drawn or manipulated one after another, from the beginning to the end of the animation. This is also called frame-by-frame animation, since the animator draws each and every frame. Straight-ahead is great for creating fast, realistic action scenes, since the movement produced with this principle is very fluid. One downfall to the straight-ahead principle is that sometimes proportions, weight and volume get distorted as the animator moves from one frame to the next.

- Pose-to-Pose: A type of animation that involves using set keys (such as the keyframes we use in Anime Studio) to create the flow of animation. Poses are set up at important moments in the animation—typically where an object begins moving, stops moving or changes direction. In the earlier days of animation, pose-to-pose was used by animators to speed up their animation process. Animators would draw key poses throughout the animation, then have their assistants draw the transitions between each pose or come back and draw the poses after the overall actions were decided upon. Digital animation software such as Anime Studio now replicate this process with the use of keyframes, drastically reducing the time required for frame-by-frame animation. Pose-to-pose is of particular value when an animation's timing is important. For instance, characters who are lip syncing or dancing to music can be animated with pose-to-pose to help match their actions to sound.

How to : Straight-Ahead and Pose-to-Pose Animation

Up until this point, most of the principles you've been studying & completing have used pose-to-pose animation, since they include the use of keyframes. For illustration purposes, we are going to use straight ahead (or frame-by-frame) animation to create a brief inchworm animation. Normal frame-by-frame animation is done by drawing each frame or every second or third frame.
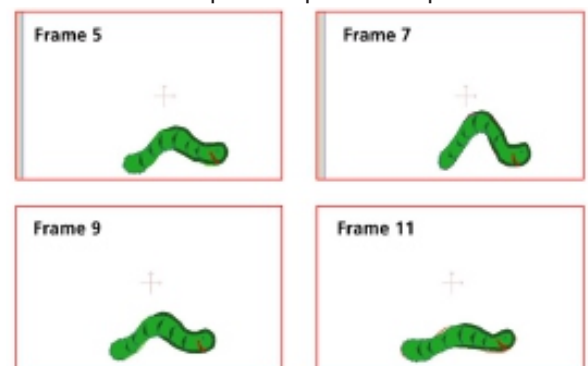
Timing (Principle 10)

Timing is a critical part of animating that establishes physical realism and enhances storytelling and staging. This principle is achieved through both physical timing and theatrical, emotional timing.

Proper timing helps objects appear to follow the laws of physics, making your animation look more realistic and believable. For instance, in physical timing, heavy objects take longer time and greater effort to move than light objects. If a character is picking up a large, heavy suitcase versus a small purse, the suitcase will be lifted much slower than the purse.

In theatrical timing, animators use the speed of movements to enhance the emotion of a scene or character. For example, if a character looks over his left shoulder slowly, he might be noticing an object pass by or acknowledging a sound he heard. On the other hand, if the character looks over his shoulder very quickly, the audience will perceive that he is startled or shocked by something in the scene.

How to : Timing

In this section, the use of timing principle is illustrated. The animator will make a timer count down from 10 to 1 by displaying a different number per second. Timing is used to burn the wick of a bomb as the timer ticks closer to 1 and will synchronize a sound when the bomb explodes.

This illustration will display both aspects of timing. The countdown will physically be timed to coincide with seconds, and it will create suspense and emotional timing as the audience waits for the explosion.
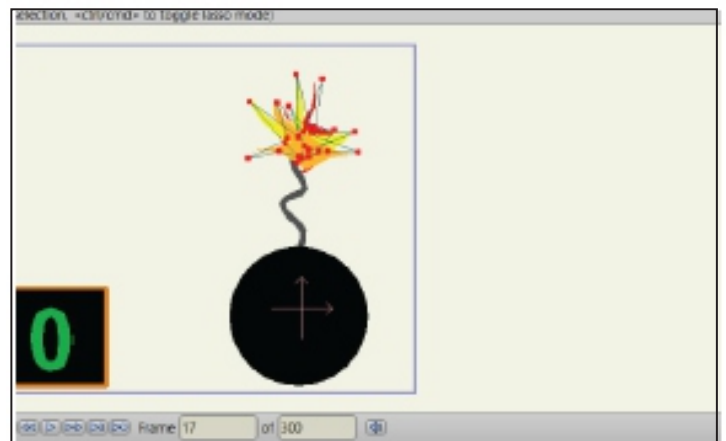
In Anime Studio, the Timeline and Sequencer are the main tools that help us accomplish this principle.

Solid Drawing: (Principle 11)

The principle of solid drawing means to draw animations well using the fundamentals of traditional art, including composition, balance, form, anatomy, weight, volume, proportions, light, shadow, etc. Creating well-drawn characters, objects and scenes help create the illusion of life in an animation. Although animation software has made it possible for animators to animate without having to create images from scratch, it is still important to have a general understanding of these concepts and apply them to your animations.

How to : Solid Drawing

Solid drawing principle illustrates by drawing a simple cartoon character. As you draw, try to create a figure that maintains realistic proportions, anatomy, balance and form. After the animator draws the character, he/she will learn how to create a rigging system so you can easily manipulate his bones and animate him.
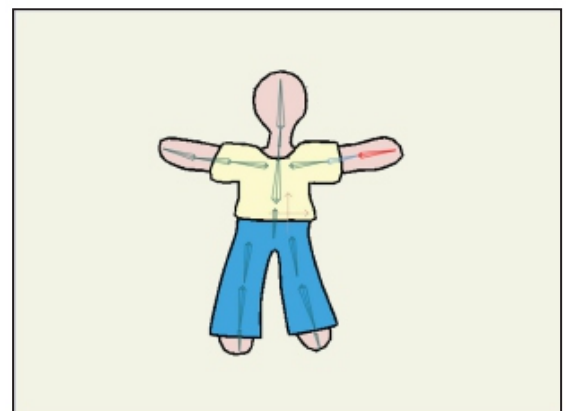
Staging (Principle 12)

The purpose of staging is to guide the audience's attention toward the main storyline of your animation so the message is kept clear. This principle helps the audience understand what is happening through the presentation of the elements in your animation. Staging uses a variety of tools to accomplish this including background elements, lighting, props, character placement, camera angles and contrasting actions.

When staging is done well, background elements direct the audience's attention toward the main actions, and actions successfully communicate the attitude, emotions and reactions of characters to help support the storyline. The main point of this principle is to keep the audience focused on what is relevant to the story and to leave out elements that might detract from this goal.

How to : Staging

This last principle, building a background scene with a number of different elements, setting the stage to bring attention to your main character is done. The animator incorporates characters from the previous principle. During this process arranging layers in the Layers window are learned.
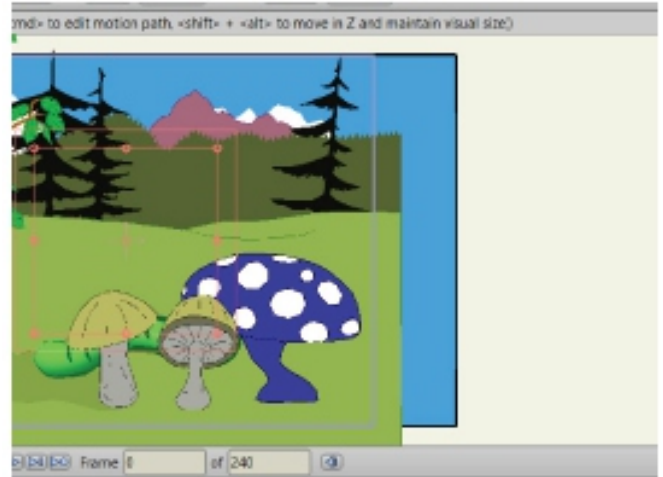
Below are images that applies the different principles of animation.
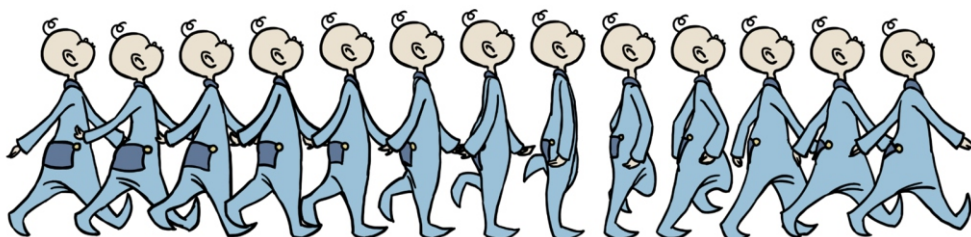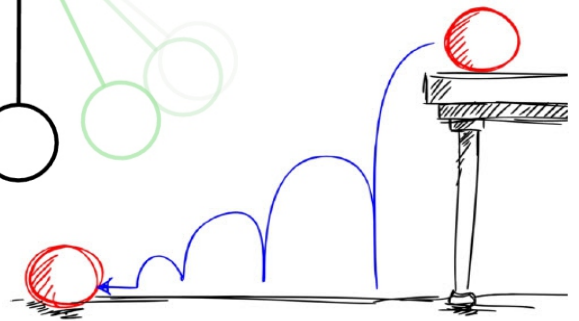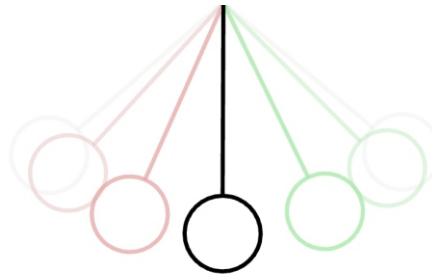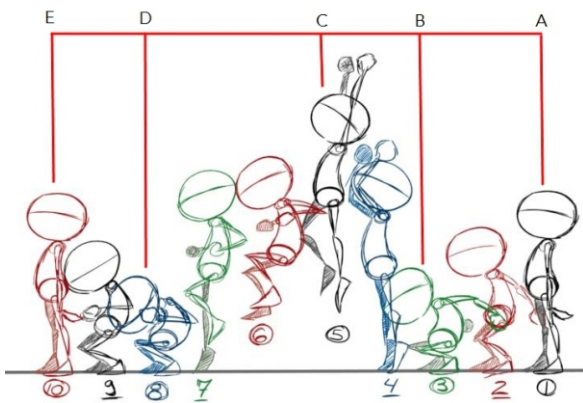
Part 2

Animating with
Anime Studio

Laboratory Manual

FAST ΛNIMATION

Lab Exercise 2.5

Task: Create a walk cycle animation featuring Stickman
Expected Output File: Fast Animation.mp4
Work File: Lab 2.5 Fast Animation

① View the expected output file indicated above.
② Launch the Anime Studio.

③ Open the Anime Studio work file **Lab 2.5 Fast Animation. anime** located in Chapter 2.

④ Now, our goal is to let Stickman walk towards the stairs then go up . While he approaches the stairs, its size becomes smaller. For now we will not do the detailed walk cycle since this is our first time to animate a character.

⑤ On the Layers panel, click the Stickman 3/4 Right layer, then click the Transform Layer tool.

⑥ On your Timeline Channel tab, move to frame 18, then **drag** Stickman towards the stairs as shown. Anime Studio will then create a path for this animation, where a doted blue line came out.

⑦ Now, resize Stickman and be sure that it is proportionate to the stair's size. Do this by dragging one of the corner of Stickman.

⑧ Since we are going to let Stickman climb the stairs, we have to flip him to face to the stairs. Be sure that the Stickman bone layer is selected, now click the **Flip Layer Horizontally button** located at the top bar as shown.

⑨ Now let Stickman walk through the stairs, to do that, in the Timeline Channel tab click to **Frame 24** then drag Stickman through the stairs as shown.

⑩ Click the **Flip Layer Horizontal button** to flip Stickman facing the level 2 stairs as shown.

21
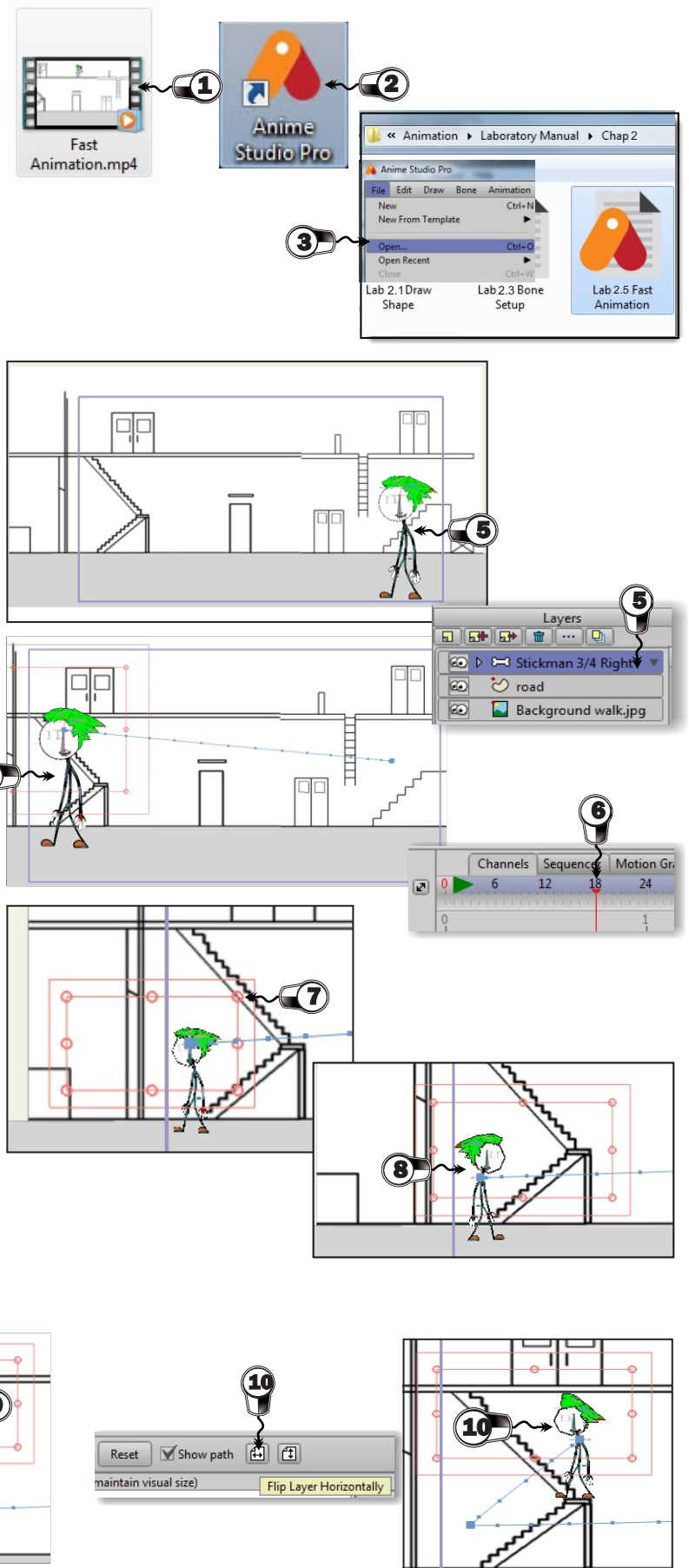
11. Huh! the second floor is near, we have to let Stickman move up. In the Timeline Channels tab move to **Frame 30**. Now drag him to the second floor then flip to face right as shown.
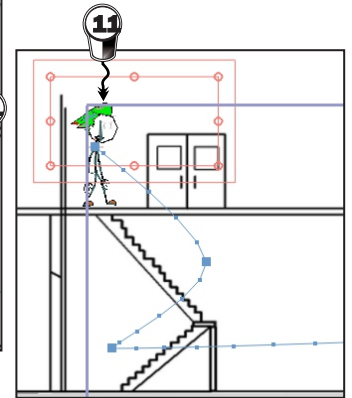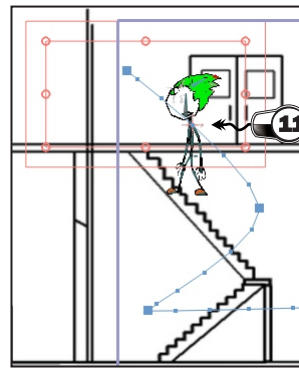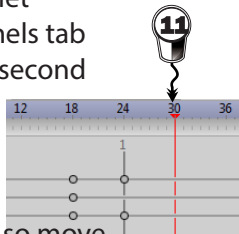
12. Stickman has to walk to the second floor, so move to Frame 42 and drag him as shown.

13. Stickman has to walk to the second floor, so move to Frame 42 then drag him as shown.

14. Stickman has to walk to the second floor, so move to Frame 42 then drag him as shown.
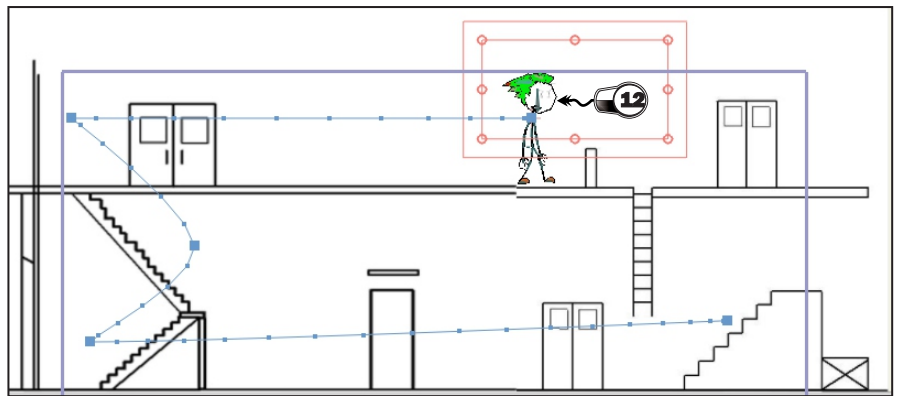
15. This time it's your turn to make Stickman go back to where he started. Follow similar steps as Stickman goes back to its original location (ground floor).

16. Or you can let Stickman pass through the ladder going down and jump as well. Let you imagination go deeper as you animate Stickman with fun. Congratulations! you have just made your first long animated clip featuring Stickman.

   If you are done, be sure to save your project and create an Mp4 file and show it to your teacher. Below is final animated path of Stickman.
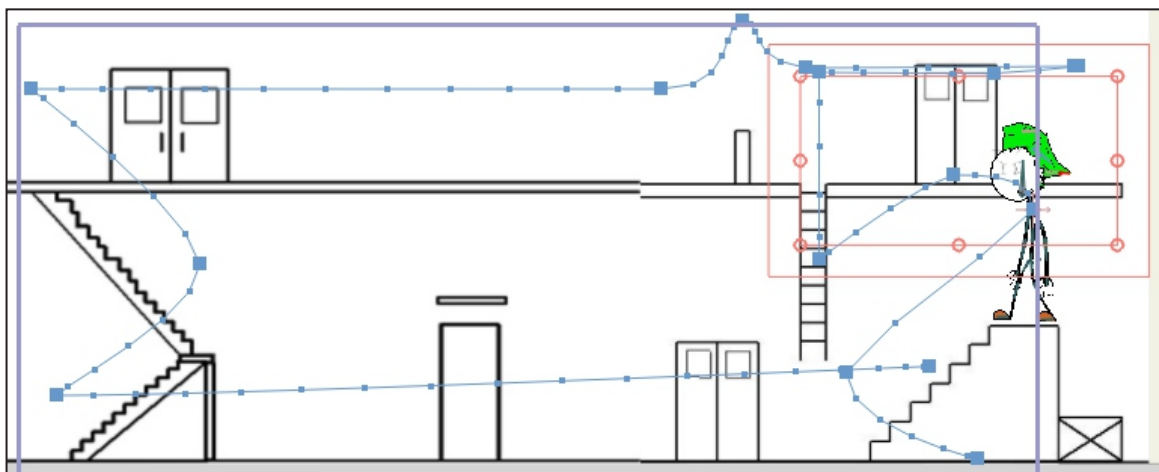
**Stickman's complete animation path**

DETAILED WALK CYCLE

Lab Exercise 2.5

Task: Create a detailed walk cycle animation featuring Stickman
Expected Output File: Fast Animation.mp4
Work File: Lab 2.6 Detailed Walk Cycle.anime

**1** View the expected output file indicated above.

2 Launch the Anime Studio.

3 Open the Anime Studio work file **Lab 2.6 Detailed Walk Cycle. anime** located in Chapter 2.

4 In our previous activity, Stickman was able to walk up to the 2nd floor and back using the fastest animation way. In the real world animation, you should make Stickman walk like a human though he is just a stickman. Meaning you have to observe and follow sequence of pattern when a character walk or move. The next steps will take to what we mean here. Now open the **Walk Cycle Pattern.jpg** to view the proper way & positions when a character walks.

5 The walk cycle pattern is our guide when animating Stickman, we have to follow each position until the end of the walk cycle. You have to use the **Pan** and **Zoom** tool to easily navigate and rigged/configure the characters position. Be sure that you have selected the *Stickman bone layer.*

6 Now, move to **Frame 2** then drag the different bone parts of Stickman using the **Manipulate Bones** tool to follow like the Contact position as shown. Do not hesitate to drag the correct bones since it is already rigged for you.

7 Move to **Frame** 4, then drag Stickman a little farther using the **Transform Layer** tool. Click the **Manipulate Bones** tool and follow the **Recoil** position by moving the different bone part of Stickman.

8 Perform the previous step for **Frame 6, 8..to the last walk cycle frame** or until Stickman walks across the scene or background. The picture below is the first 5 frames in the walk cycle. Save your file to your folder if you are done..
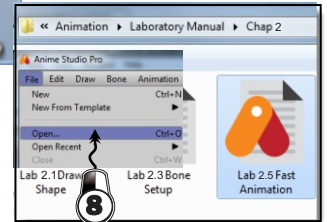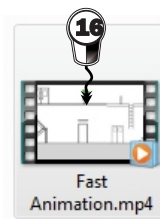
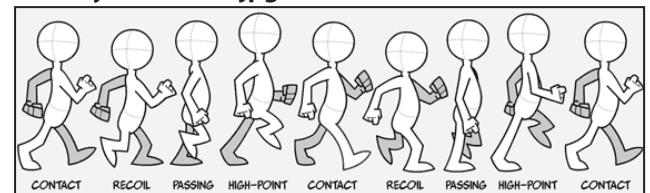**Walk Cycle Pattern.jpg**
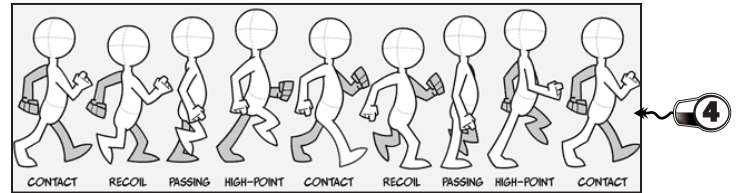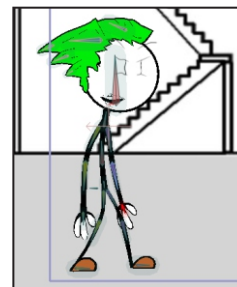
Frame 0
Starting position

Frame 2
Contact position

Frame 4
Recoil position

Walk Cycle Pattern.jpg

Frame 6
Passing position

Frame 8
High-Point position

23