



# RAMA UNIVERSITY

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## FACULTY OF ENGINEERING & TECHNOLOGY

BCS -504 Computer Graphics &  
Multimedia

Lecture-36

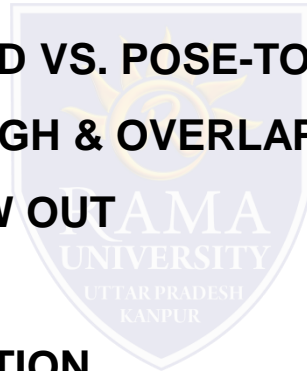
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# OUTLINE

- **THE 12 PRINCIPLES OF ANIMATION**
- **1. SQUASH & STRETCH**
- **2. ANTICIPATION**
- **3. STAGING**
- **4. STRAIGHT AHEAD VS. POSE-TO-POSE**
- **5. FOLLOW THROUGH & OVERLAPPING ACTION**
- **6. SLOW IN & SLOW OUT**
- **7. ARCS**
- **8. SECONDARY ACTION**
- **9. TIMING**
- **10. EXAGGERATION**
- **11. SOLID DRAWING**
- **12. APPEAL**



# The 12 Principles of Animation

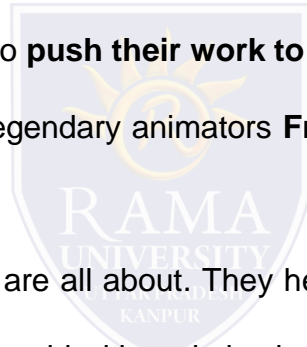
The foundation of any animation education is the **12 principles of animation**.

The 12 principles were a set of core concepts that were developed in the 1930's by animators at **Walt Disney Studios** as they were transitioning from doing shorts to feature films. It was a gradual process of discovery and refinement as the animators tried to **push their work to a new higher standard**.

These 12 principles were first compiled by the legendary animators **Frank Thomas** and **Ollie Johnston** in 1981 in their book ***The Illusion of Life***.

Creating the illusion of life is what the principles are all about. They help us create characters that look like they have weight, personality, and exist in a real world with real physics at work.

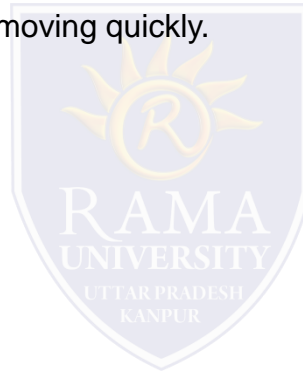
**Even though they were developed by 2D animators, they still apply to 3D and any other type of animation.**



# 1. Squash & Stretch

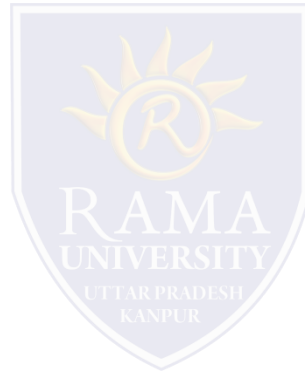
Squash and stretch describe how an object changes shape in response to forces acting on it.

**Squash** is when the object is compressed by an impact of an opposing force. **Stretch** is when an object is distended by something pulling on it, or by moving quickly.



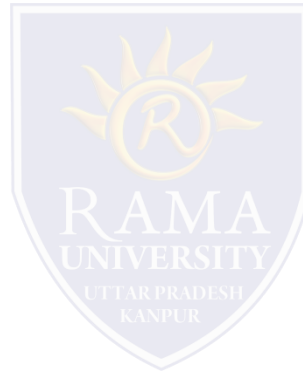
## 2. Anticipation

Anticipation is a smaller movement that comes before a major one, and signals that the major movement is about to happen.



## 3. Staging

Staging is the presentation of a shot in a way that makes the content of the shot as **clear** as possible, and the narrative function of the shot as **strong** as possible.



## 4. Straight ahead vs. Pose-to-pose

Straight-ahead and pose-to-pose are different approaches to animating.

**Straight-ahead** means creating each new frame in sequence from beginning to end. **Pose-to-**

**pose** means creating the key poses for each action first, and then filling in the in-between poses.



## 5. Follow Through & Overlapping Action

Follow-through and overlapping action refers to the tendency of different parts of a body to move at different speeds.

This includes the concept of **drag**, which is when one part of the body lags behind when a motion starts.





## 6. Slow in & Slow out

Slow-in and slow-out refer to the tendency of objects to gradually **accelerate** (and then **decelerate**) when moving from one position to another.

These are sometimes referred to as **ease-in** and **ease-out**, or simply **easing**.



# 7. Arcs

The principle of arcs come from the observation that living things don't move in straight lines, but rather in **curved motions**.

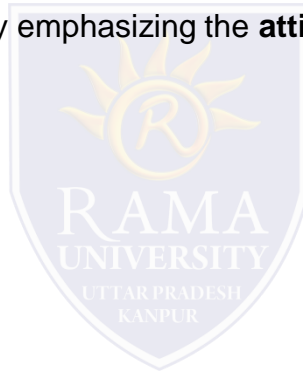
Creating graceful, clear arcs often elevates the animation and reveals the experience level of the animator.



## 8. Secondary Action

Secondary action refers to **smaller movements** (or gestures) that **support** the primary actions of a character.

These actions make the shot clearer by emphasizing the **attitude** or **motivation** behind the movement.



# 9. Timing

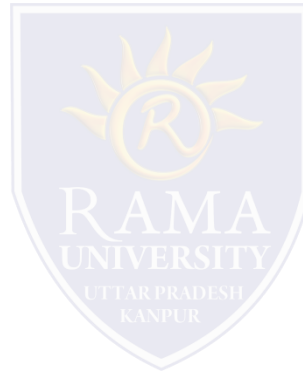
Timing is controlling the **speed** of an action through the number of frames used to represent it.

It is one of the **most fundamental** of the 12 principles and takes years to master.



# 10. Exaggeration

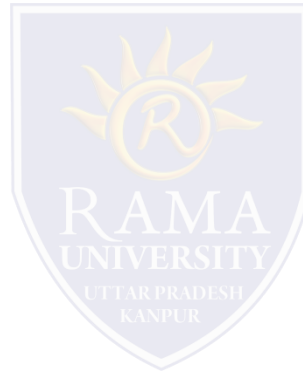
Exaggeration means representing a subject in a **heightened** or more **extreme** way, rather than strictly realistic, in order to push your animation further.



# 11. Solid Drawing

Solid drawing means posing characters in a way that creates a sense of **volume**, **weight** and **balance**.

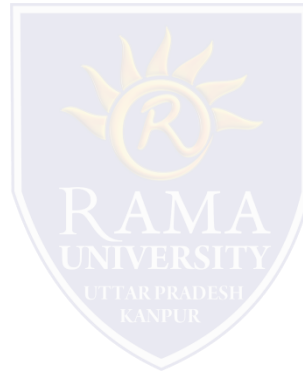
Drawing for animation requires being able to draw the characters from any angle or pose, with three-dimensionality in mind.



## 12. Appeal

Appeal is a broad term for any qualities of a character's design that makes them inherently **compelling** to watch.

This includes the design of the character, as well as how the character is animated.



# Multiple Choice Question

## MUTIPLE CHOICE QUESTIONS:

Sr no	Question	Option A	Option B	OptionC	OptionD
1	Point clipping tells us whether the given point (X, Y) is within the given window or not; and decides whether we will use the ..... of the window.	minimum	minimum and maximum coordinates	maximum coordinates	none of these
2	A line-clipping algorithm processes ..... in a scene to determine whether the entire line or any part of it is to be saved for display	each line	exact line	each point	none of these
3	A .....is a rectangular region in the world coordinate system. This is the coordinate system used to locate an object in the natural world	viewing	Window	clipping	All of these
4	The world coordinate system does not depend on a display device, so the units of measure can be .....	positive	negative	decimal numbers	All of these
5	A Viewport is the section of the .....where the images encompassed by the window on the world coordinate system will be drawn	screen	destop	front end	none of these



# REFERENCES

- <http://www.engppt.com/search/label/Computer%20Graphics>

