



ANIMATION

LECTURER VU MINH TUAN

FACULTY OF INFORMATION TECHNOLOGY, HANOI UNIVERSITY

OVERVIEW



TRƯỜNG ĐẠI HỌC HÀ NỘI
HANOI UNIVERSITY

- Define animation and describe how it can be used in multimedia
- Discuss the principles of animation
- Discuss the animation techniques of cel and computer animation and choose the correct file types for animations
- Create computer-generated animations from multiple still image

THE POWER OF MOTION



TRƯỜNG ĐẠI HỌC HÀ NỘI
HANOI UNIVERSITY



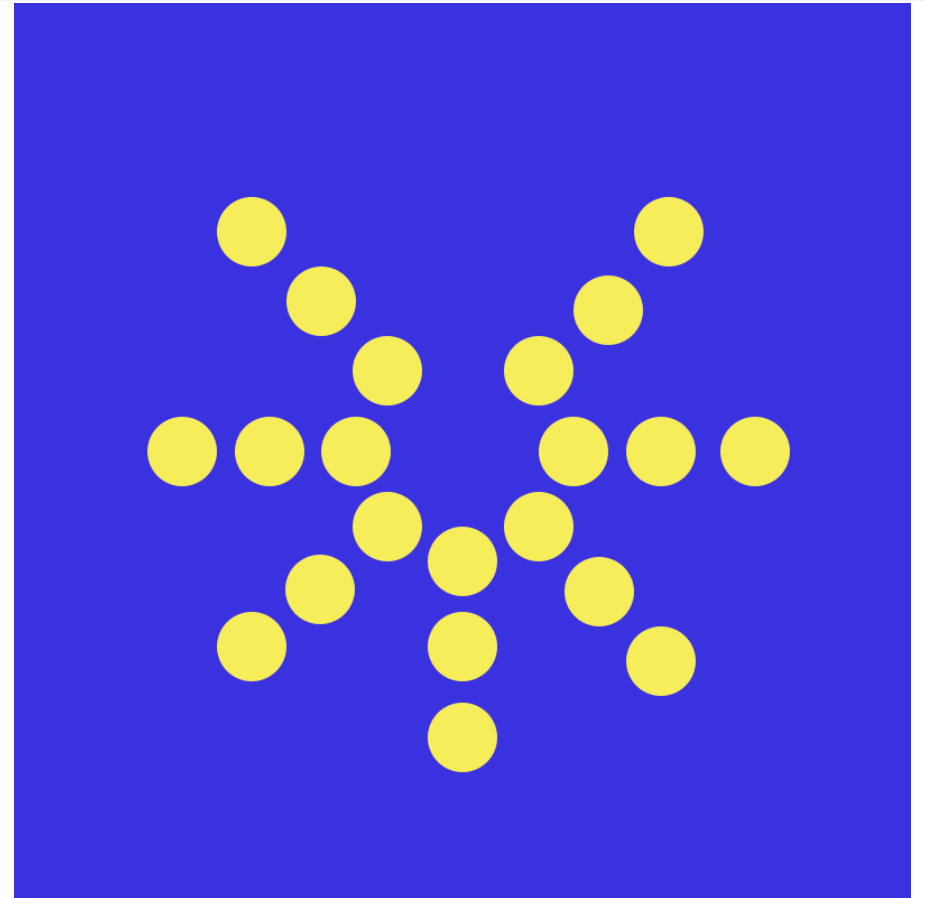


THE POWER OF MOTION

- It makes static presentations come live
- Animation grabs attention
- Transitions are simple forms of animation: wipes, fades, zooms, dissolves
- These can be used for primitive animation

PRINCIPLES OF ANIMATION

- Still images are flashed in sequence
- Frame rate measures the speed of change



PRINCIPLES OF ANIMATION

Frames



Flickering



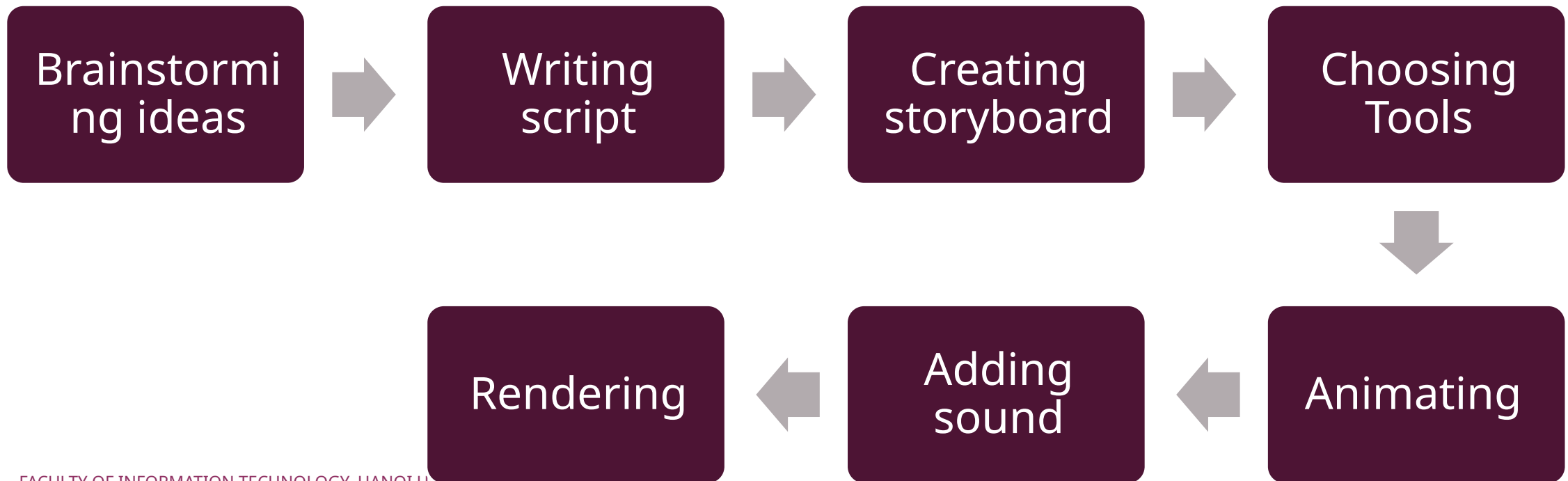


ANIMATION BY COMPUTERS

- **2D animation:** the visual changes that bring an image alive occur on the flat Cartesian x and y axes of the screen.
- **2 ½ D animation (2.5D animation):** where shadowing, highlights, and forced perspective provide an illusion of depth, the third dimension.
- **3D animation:** software creates a virtual realm in three dimensions, and changes (motion) are calculated along all three axes (x, y, and z).

ANIMATION TECHNIQUES

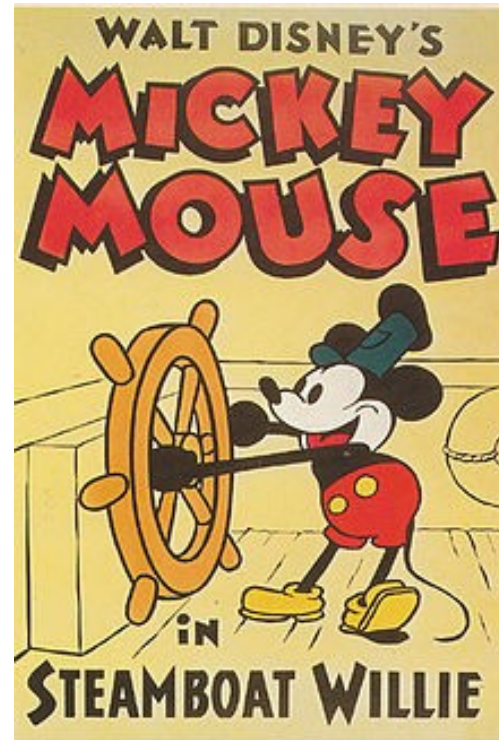
Basic steps to create animations:





ANIMATION TECHNIQUES

- Cel animation
- Computer animation



CEL ANIMATION

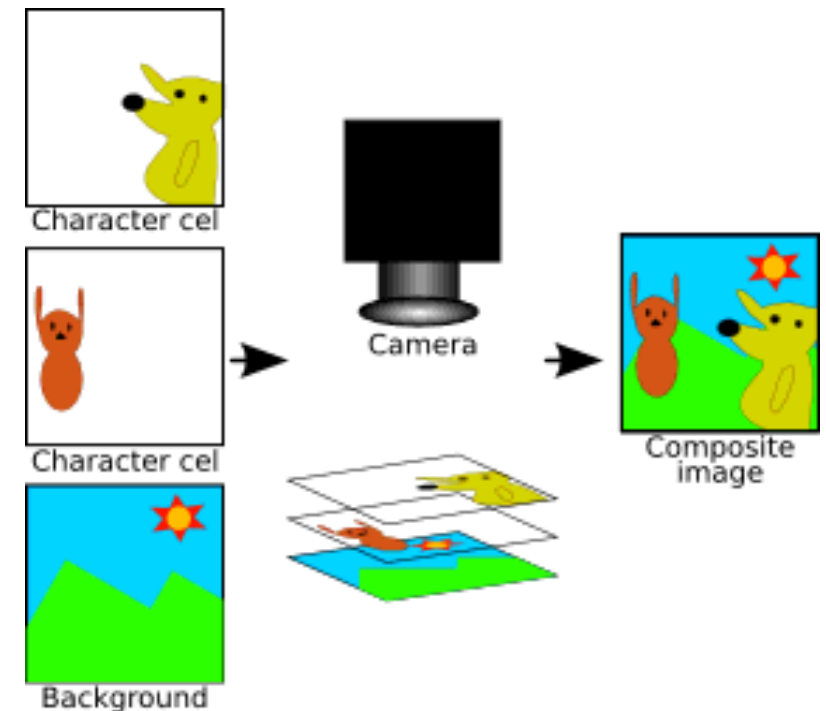


TRƯỜNG ĐẠI HỌC HÀ NỘI
HANOI UNIVERSITY

- <https://www.youtube.com/watch?v=NWiGFCAFuHU>

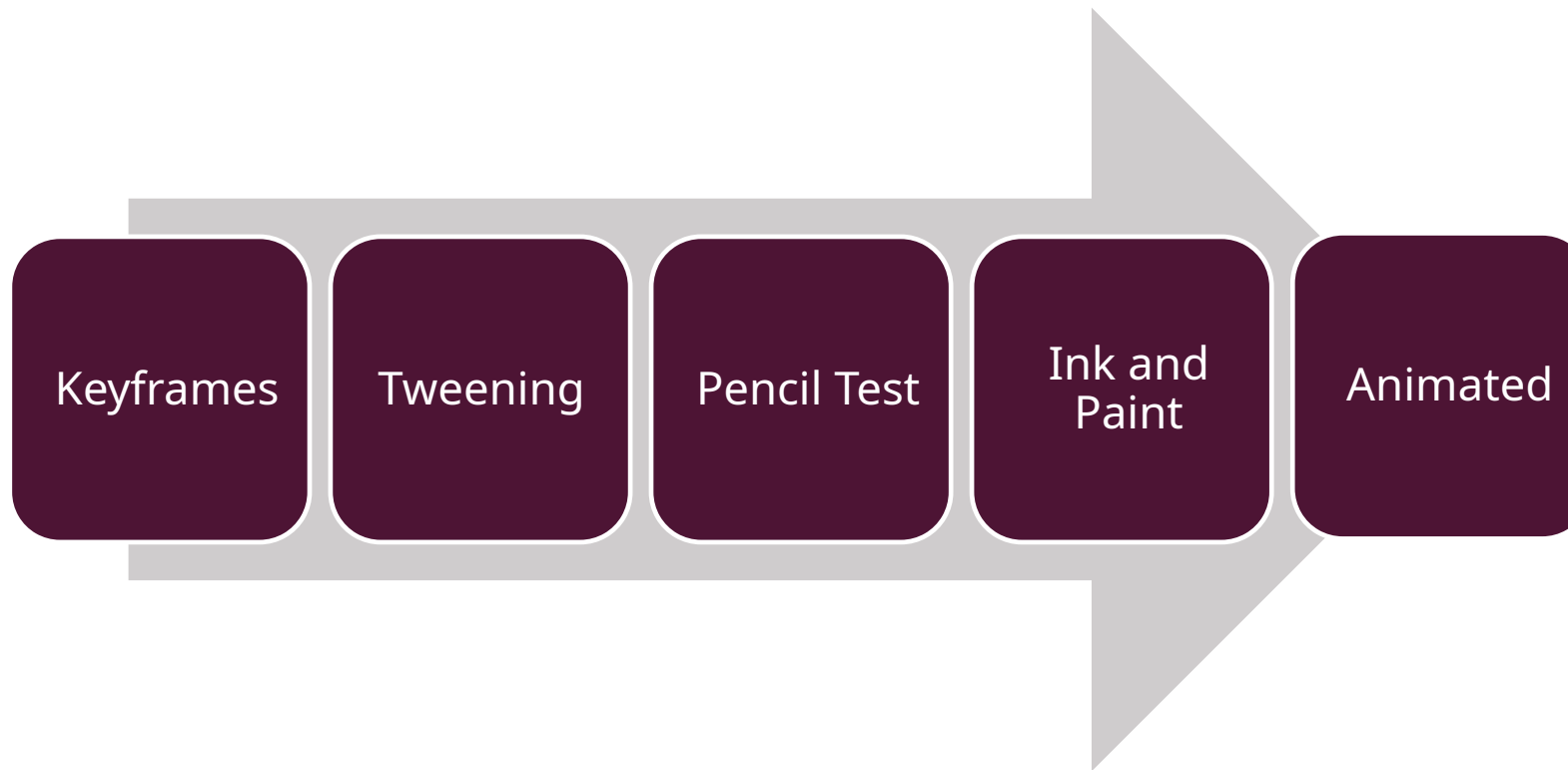
CEL ANIMATION

- Cel animation: Also known as hand-drawn animation uses a number of celluloid sheets to draw frames.
- One minute of cel animation requires 1,440 frames to be drawn (24 frames/sec. * 60 sec/min) = 1440)
- Each frame may be composed of many layers of cels





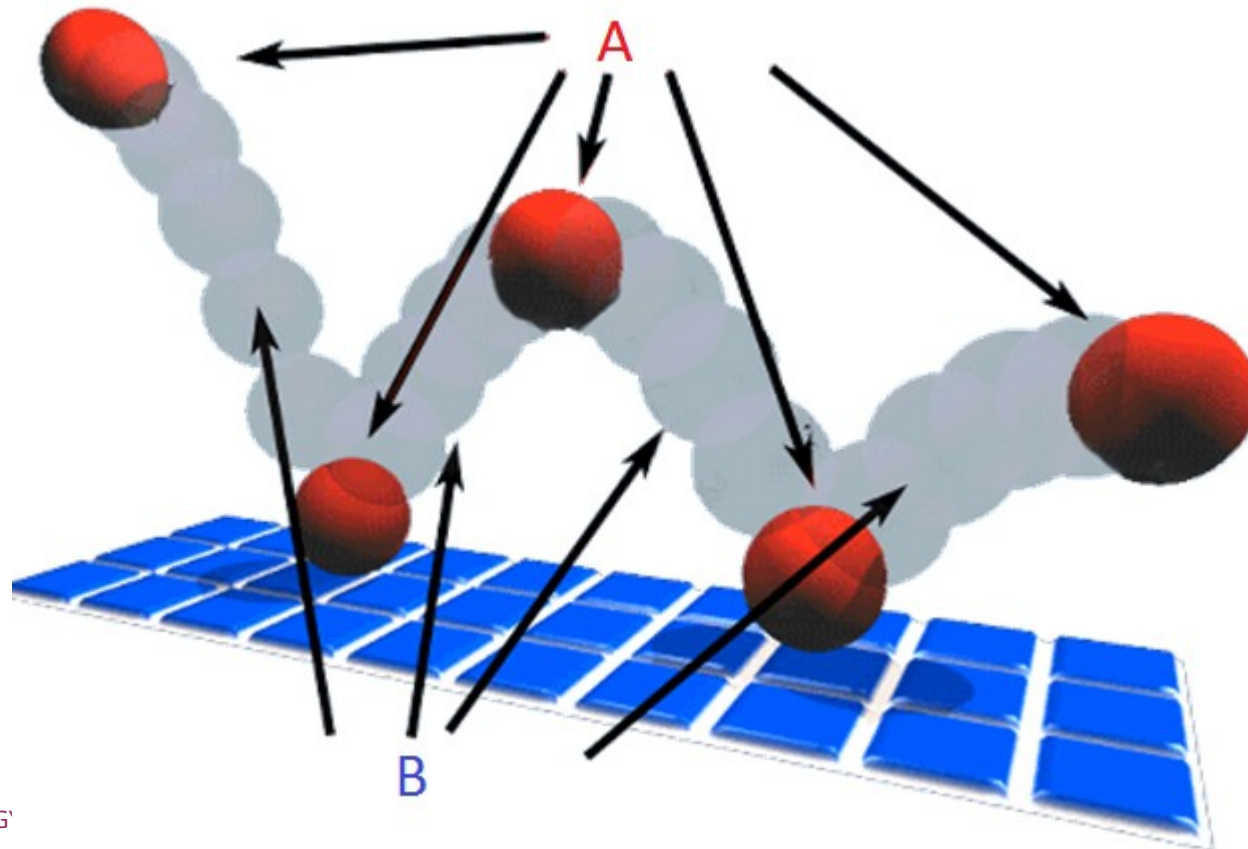
CEL ANIMATION PROCESS



KEYFRAMES AND TWEENING



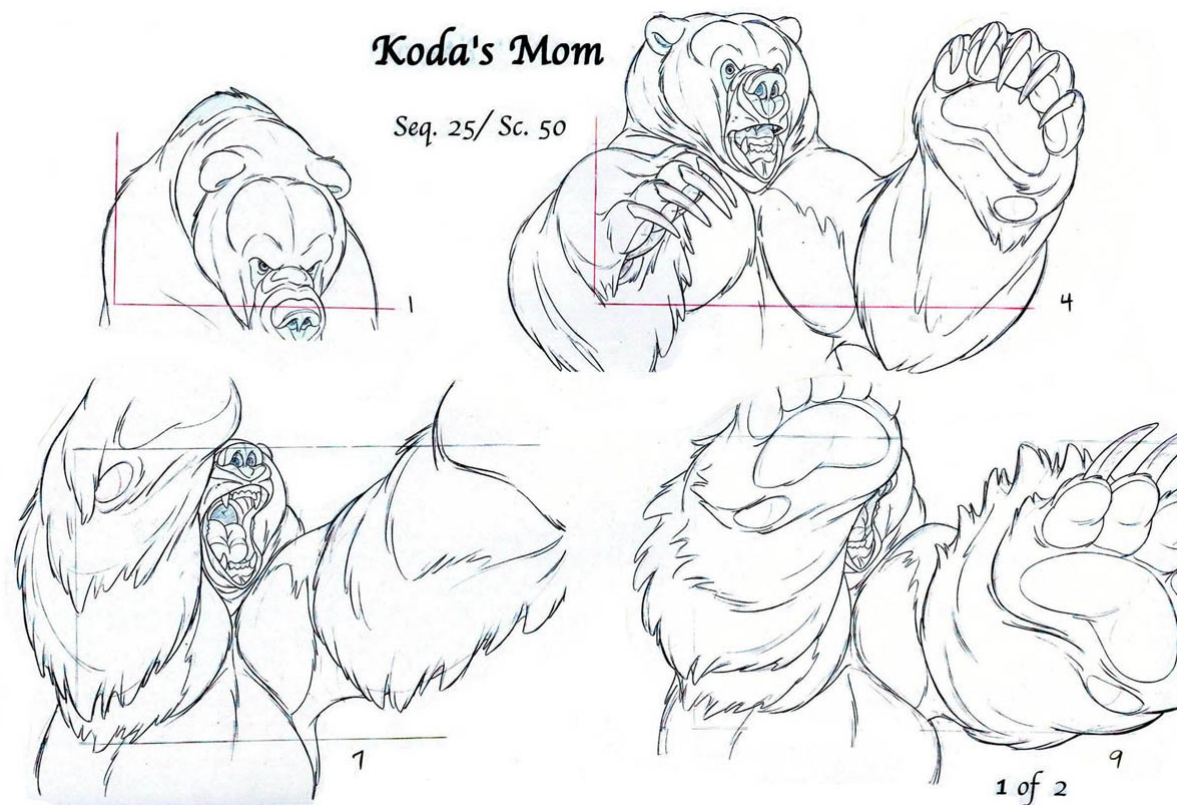
TRƯỜNG ĐẠI HỌC HÀ NỘI
HANOI UNIVERSITY



PENCIL TEST



TRƯỜNG ĐẠI HỌC HÀ NỘI
HANOI UNIVERSITY

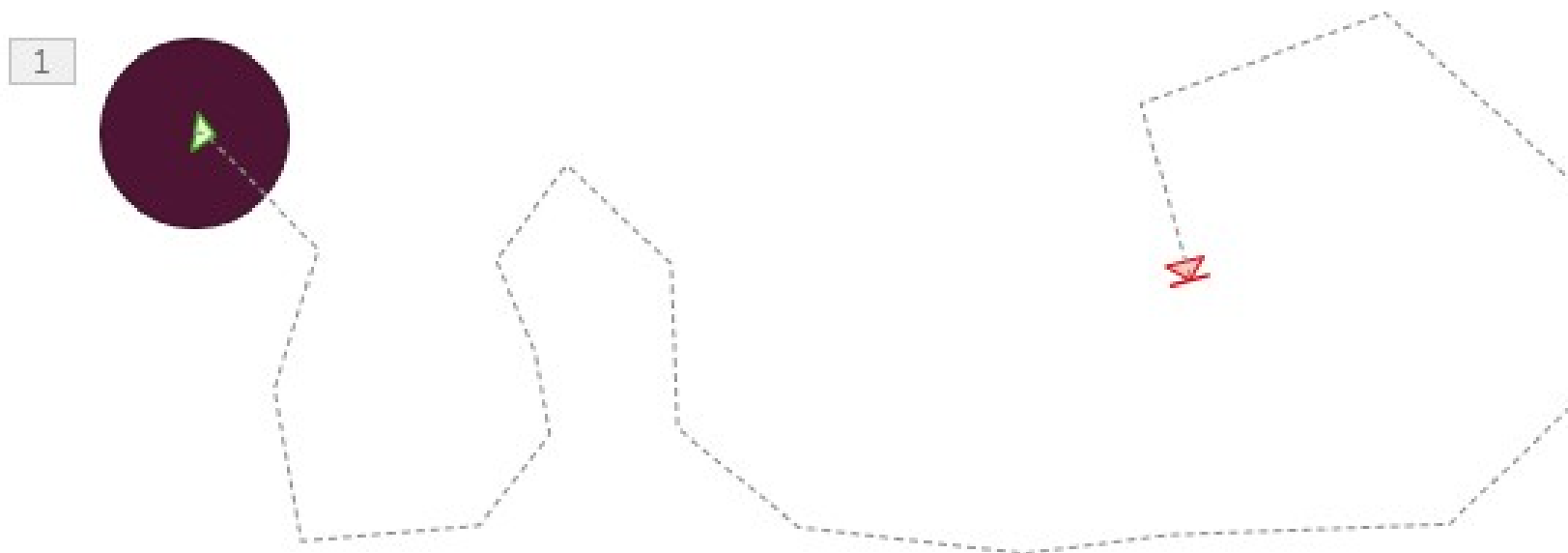




COMPUTER ANIMATION

- Computer animation uses the principles of cel animation
- In path-based 2-D animation:
 - Animators create an object and describe a path for the object to follow.
 - The computer software creates the animation based on defined paths.
 - The animation can be programmed to be interactive.
- In cel-based 2-D animation
 - Animators provides each frame of an animation
 - The frames are then composited into a single file of images to be played in sequence

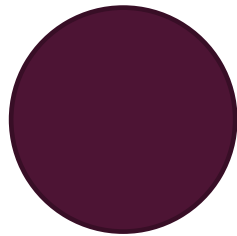
PATH-BASED ANIMATION



PATH-BASED ANIMATION



TRƯỜNG ĐẠI HỌC HÀ NỘI
HANOI UNIVERSITY



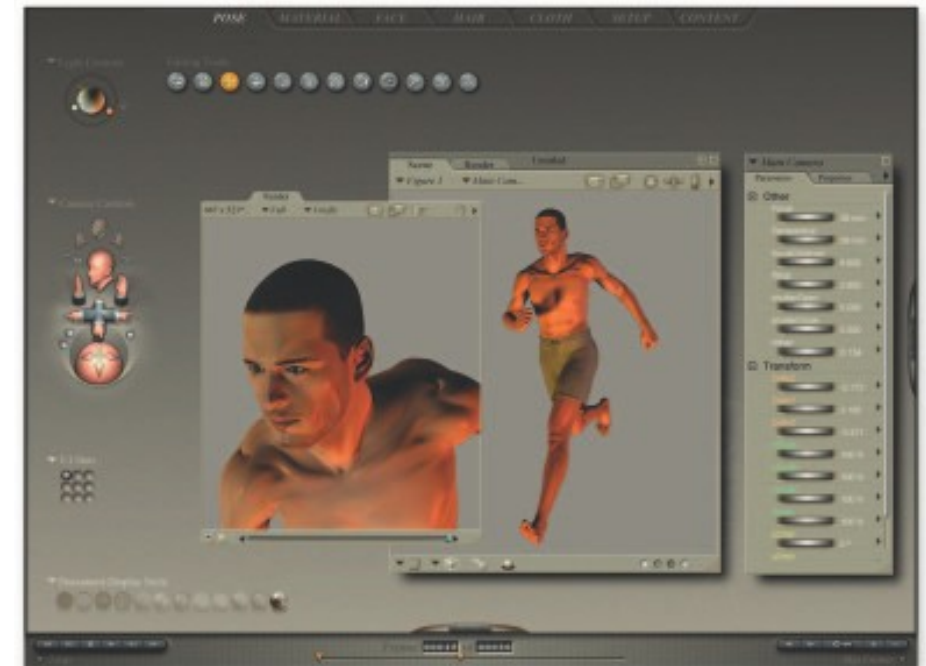


COMPUTER ANIMATION

- In computer 3D animations
 - More complicated
 - Animators mostly focus on modeling and designing the characteristics of shapes and surfaces.
- Speed of the animation depends on the speed and power of computers
- https://www.youtube.com/watch?v=2xTgUDdvc_A

COMPUTER ANIMATION

- **Kinematics** is the study of the movement and motion of structures that have joints, such as a walking man.
- What is Kinematic
- **Inverse kinematics:** is the process by which you link objects such as hands to arms and define their relationships and limits (for example, elbows cannot bend backward).





ANIMATION FILE FORMAT

- .dir and .dcr – director file
- .fli and .flc – animatorPro files
- .max – 3D studio Max file
- .fla and .swf – Flash file
- GIF89a file format:
 - It is a version of the GIF image format
 - GIF89a allows multiple images to be put into a single file and then be displayed as an animation on the web browser
 - Applications like BoxTop Software's GIFmation or Ulead's GIF Animator are needed to create GIF89a animation



ANIMATION FILE FORMAT

- Because file size is a critical factor when downloading animations to play on web pages, file compression is an essential part of preparing animation files for the web
- New with HTML5 is animation built within a .svg (scalable vector graphics) file, where graphic elements can be programmed to change over time



ANIMATION FILE FORMAT

- Some animation tools are:
 - Adobe's flash
 - Kai's Power tool's spheroid designer
 - Alias/Wavvfront's Maya
 - NewTek's lightwave

12 PRINCIPLES OF ANIMATION

#1: Squash and stretch: makes an illusion of character's elasticity

Detail



12 PRINCIPLES OF ANIMATION

#2: Anticipation: the preparation for the main action

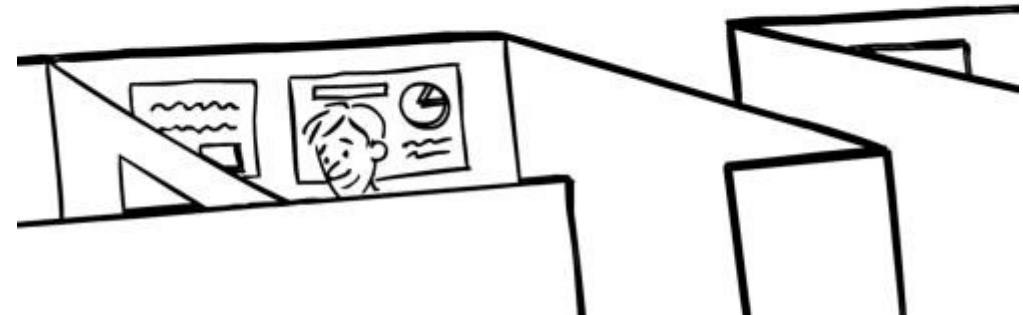
Detail:



12 PRINCIPLES OF ANIMATION

#3: Staging: Poses and actions, arrangement of cameras, background and stage elements shall clearly demonstrate character's temper, reaction, character's attitude to a story and continuity of the plotline

Detail:



12 PRINCIPLES OF ANIMATION

#4: Straight Ahead Action and Pose-to-Pose:

Straight ahead action: draw each frame of an action one after another

Pose-to-pose: draw the beginning and the end of action – then fill in the frames in-between

Detail:

A solid green rectangular box containing the text "#4 STRAIGHT AHEAD & POSE TO POSE" in white, centered.

#4
STRAIGHT AHEAD & POSE TO POSE

12 PRINCIPLES OF ANIMATION



#5: Follow Through and Overlapping Action: When a moving object such as a person comes to a stop, parts might continue to move for a while

Detail:



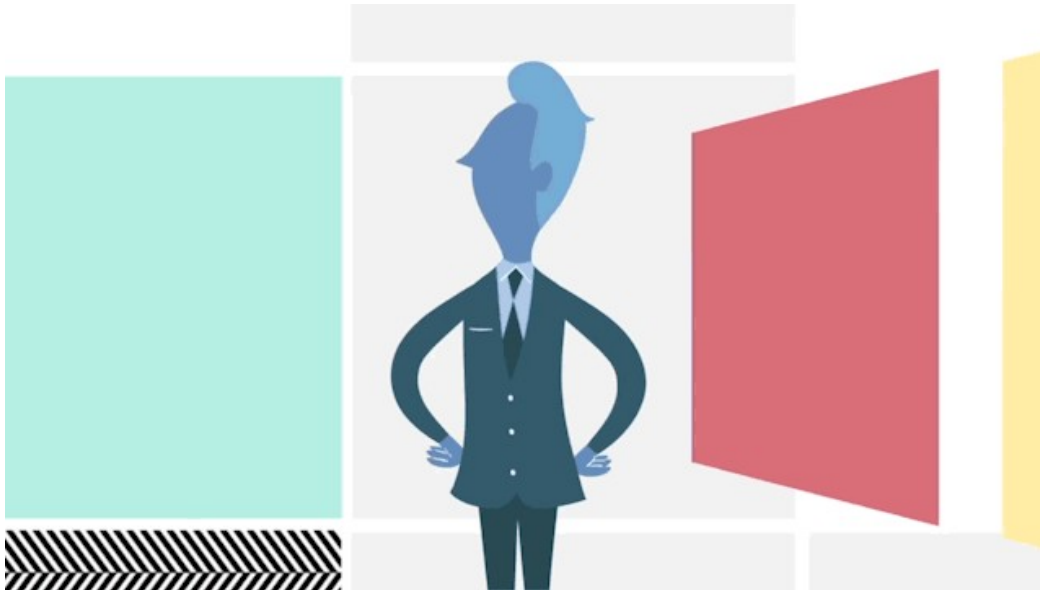
12 PRINCIPLES OF ANIMATION

#6
SLOW IN & SLOW OUT

- #6: Slow In, Slow Out (speedup and slowdown): put, everything starts with a speed-up and ends with a slowdown

Detail:

12 PRINCIPLES OF ANIMATION



- #7: Motions of all living beings (people, animals, birds, fish, etc.) and many other objects do not happen in straight lines, but in circular path called arcs.

Detail:



12 PRINCIPLES OF ANIMATION

- #8: Secondary Action: gestures that support the main action to add more dimension, personality, and insight to character animation

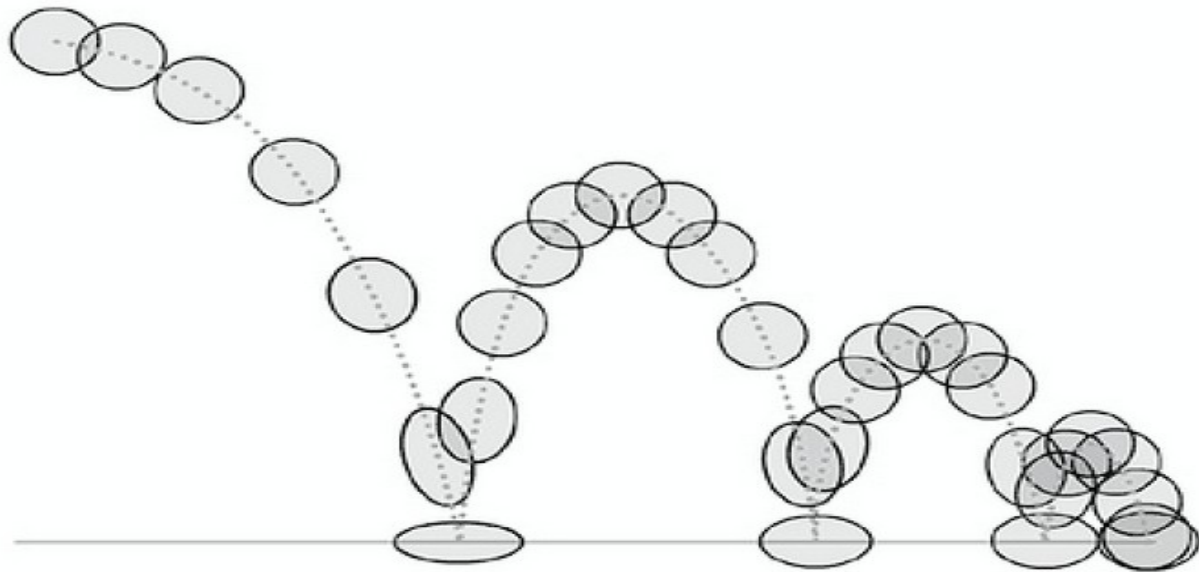
Detail:

12 PRINCIPLES OF ANIMATION

#9 Timing: time or number of frames you use to demonstrate an action or motion

Use less frames to make motion sharp and quick

Use more frames to make motion will be smooth and slow





12 PRINCIPLES OF ANIMATION

#10: Exaggeration: presents a character's features and actions in an extreme form for comedic or dramatic effect. Exaggeration is a great way to increase the appeal of a character.

Detail:

#10
EXAGGERATION



12 PRINCIPLES OF ANIMATION

- #11: Solid Drawing: Poses shall clearly express thoughts, intentions, condition, wishes and feelings of a character
- #12: Appeal: be pleasing to look at and have a charismatic aspect to them

Detail:



12 PRINCIPLES OF ANIMATION

1. Squash and Stretch
2. Anticipation
3. Staging
4. Straight Ahead Action and Pose to Pose
5. Follow Through and Overlapping Action
6. Slow-in and Slow-out
7. Arcs
8. Secondary Action
9. Timing
10. Exaggeration
11. Solid Drawing and Solid Posing
12. Appeal



ANIMATOR SKILLS

- Technical animator skills
- Graphic design skills
- Color Theory
- Sense of timing and spacing
- Analyzing skills
- Originality





REFERENCES

- *Multimedia: making it works by Tay Vanghau, 8th edition*
- *Thomas, F., Johnston, O. and Thomas, F. (1995). The illusion of life. New York: Hyperion.*
- *School, C. (2019). The 12 principles of animation. [online] Cgtarian.com. Available at: <https://www.cgtarian.com/animation-tutorials/disney-animation-principles.html> [Accessed 9 Sep. 2019].*
- *Idearocketanimation.com. (2019). [online] Available at: <https://idearocketanimation.com/13721-12-principles-of-animation-gifs/> [Accessed 9 Sep. 2019].*