Path of Action

Animation
Physics

Path of Action

The path of action is the trajectory of a moving object.

Circular Arc

Parabolic Arcs

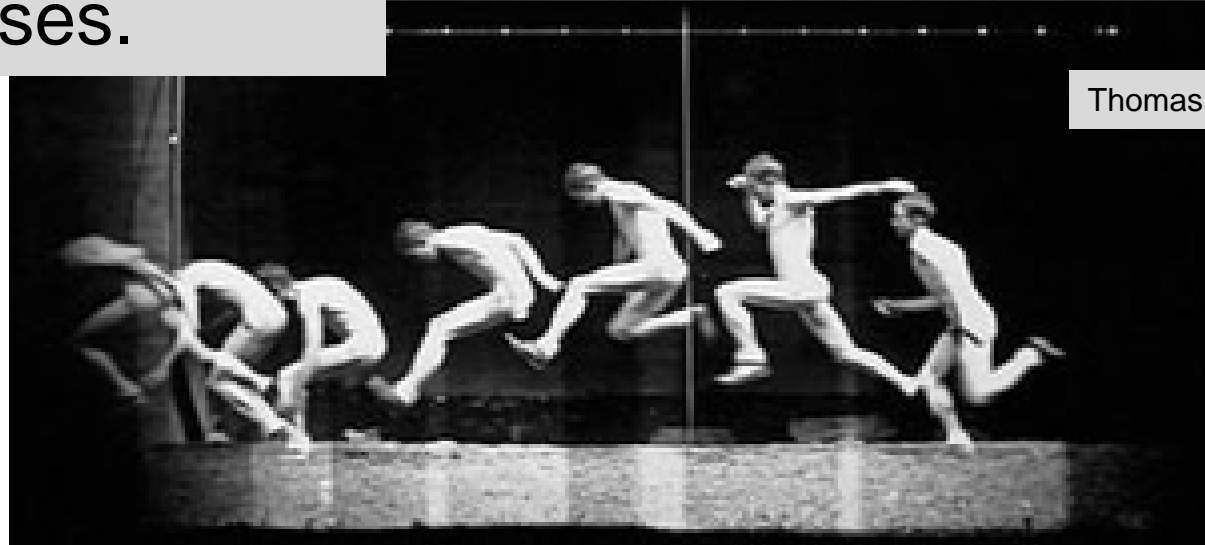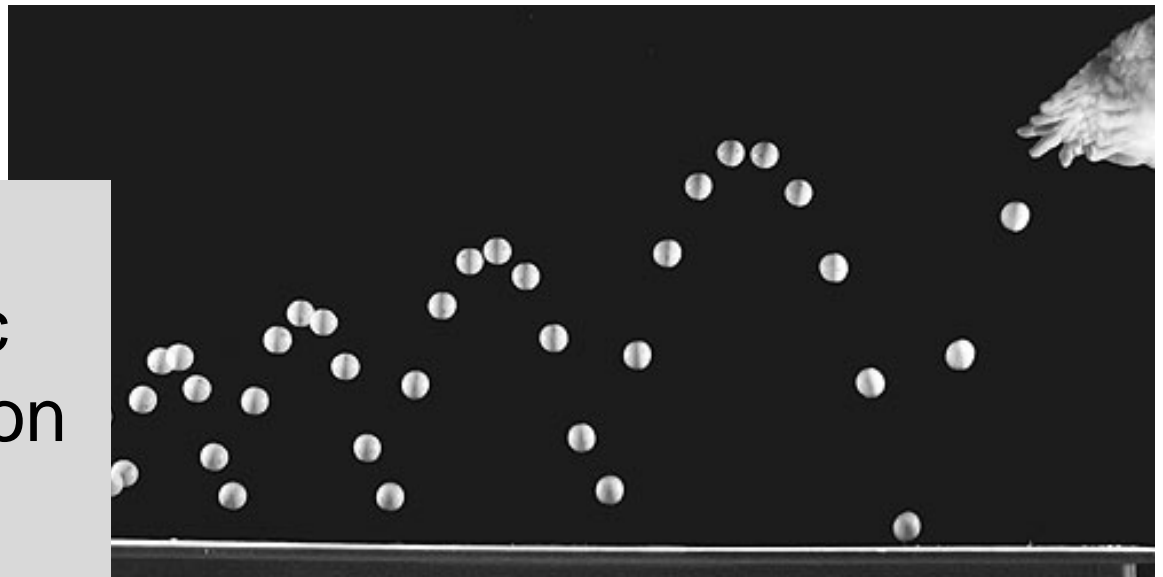Complex Path of Action
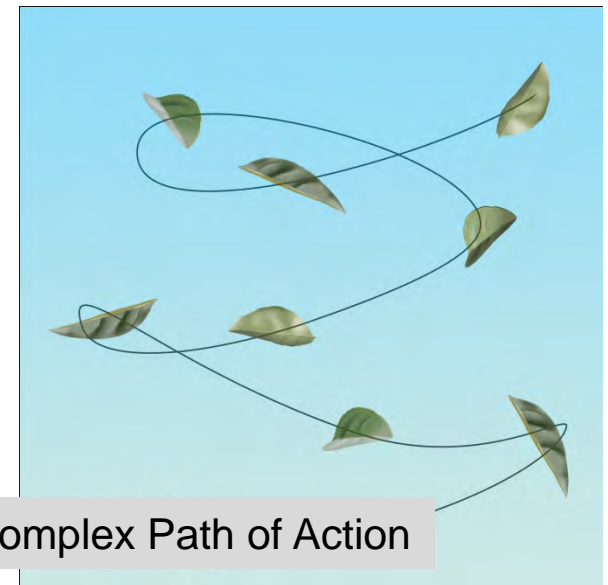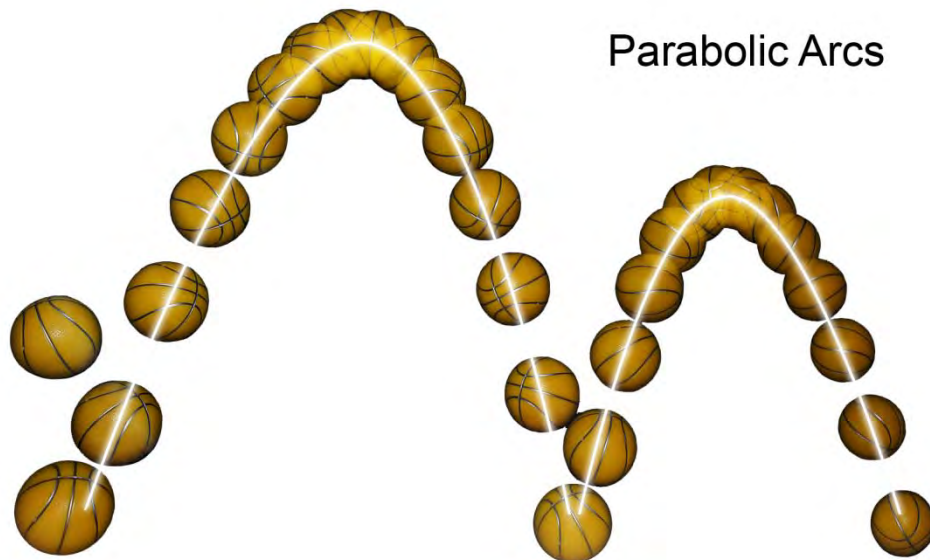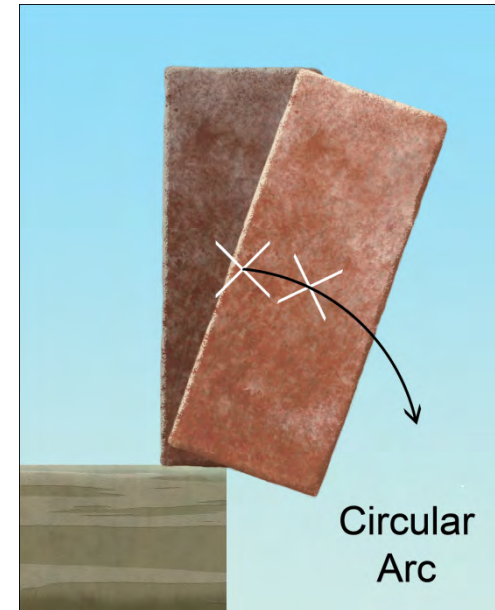
Brick Drop Exercise

Brick drop exercise illustrates the path of action for falling.
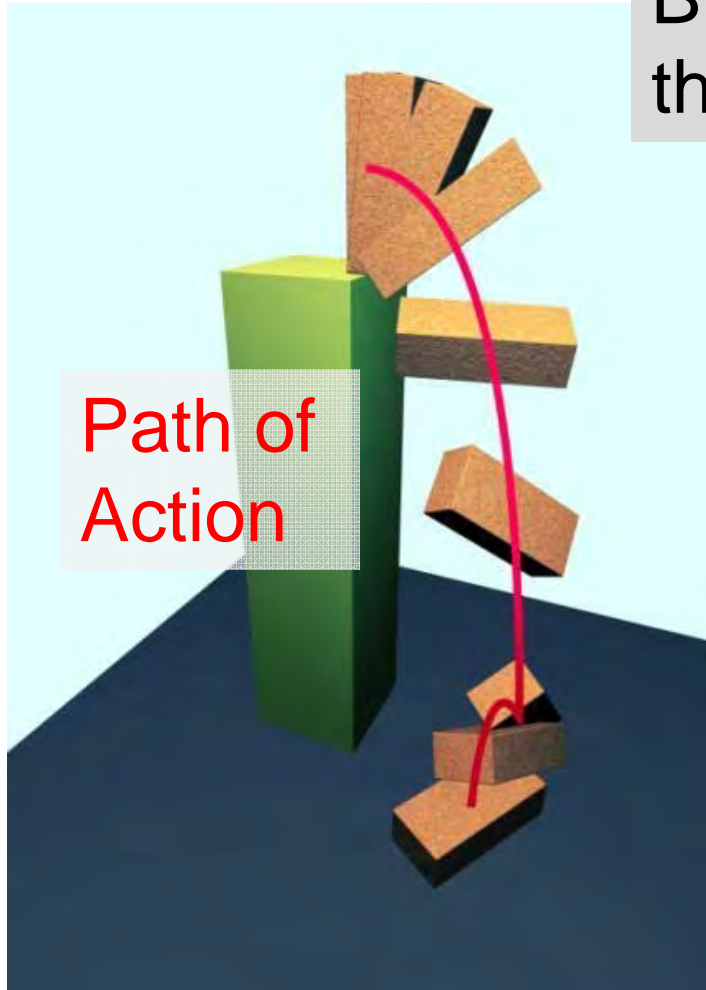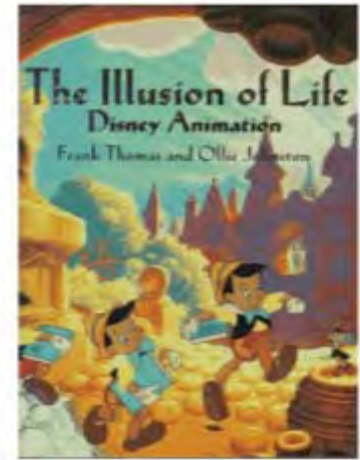
Path of Action

Path of Action & Characters

Character animation uses the same basic rules for path of action that you learn from basic exercises.

Thomas Eakins

Principles of Animation

Path of Action is not explicitly one of the Principles of Animation, but Thomas and Johnston do include Arcs in their list.

1. Squash & Stretch
2. Timing
3. Anticipation
4. Staging
5. Follow Through
   & Overlapping Action
6. Straight Ahead &
   Pose-to-Pose Action

7. Slow In and Slow Out
8. **Arcs**
9. Exaggeration
10. Secondary Action
11. Appeal
12. Solid Drawing

Importance of Arcs

Disney animation legends Frank Thomas and Olie Johnston write:

One of the major problems for the inbetweeners is that it is much more difficult to make a drawing on an arc.

Drawings made as straight inbetweens completely kill the essence of the action.

Right

Wrong
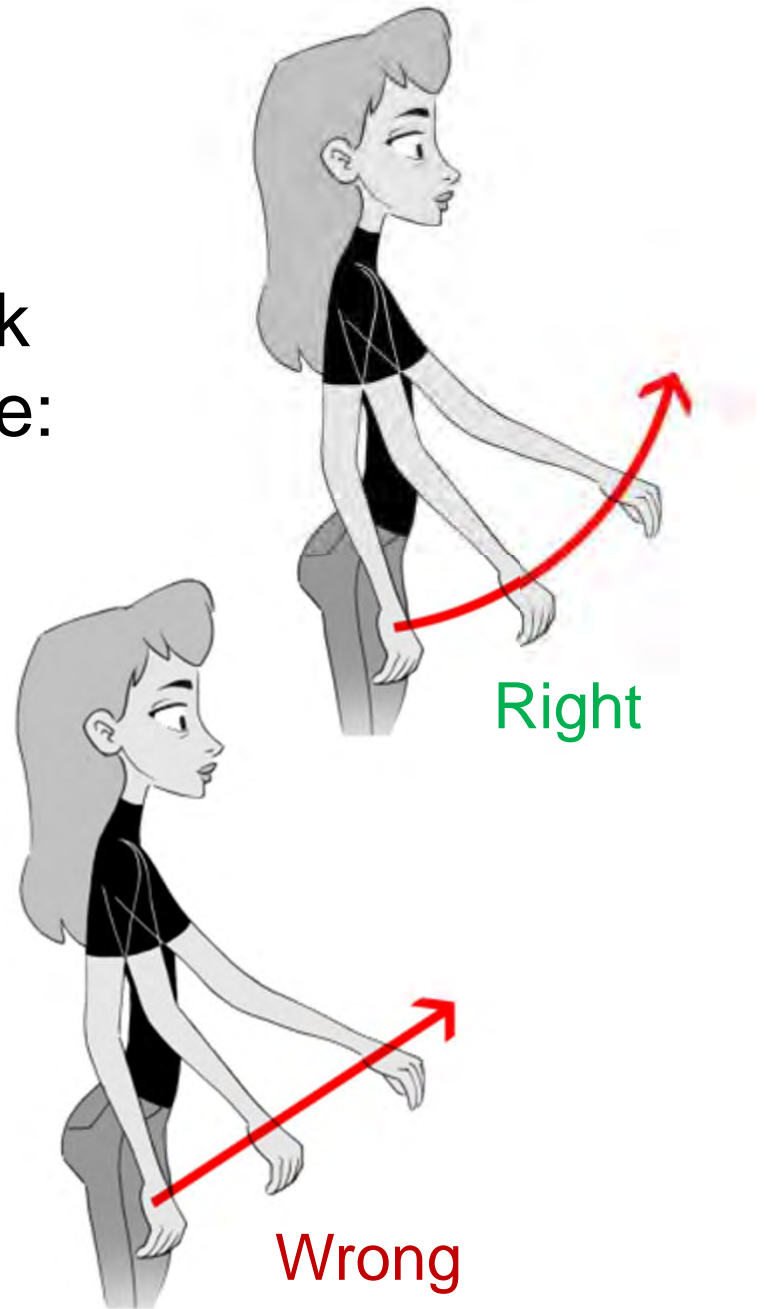
Line of Action vs. Path of Action

Individual drawings have a **line of action**, which indicates the visual flow of action in that single drawing.
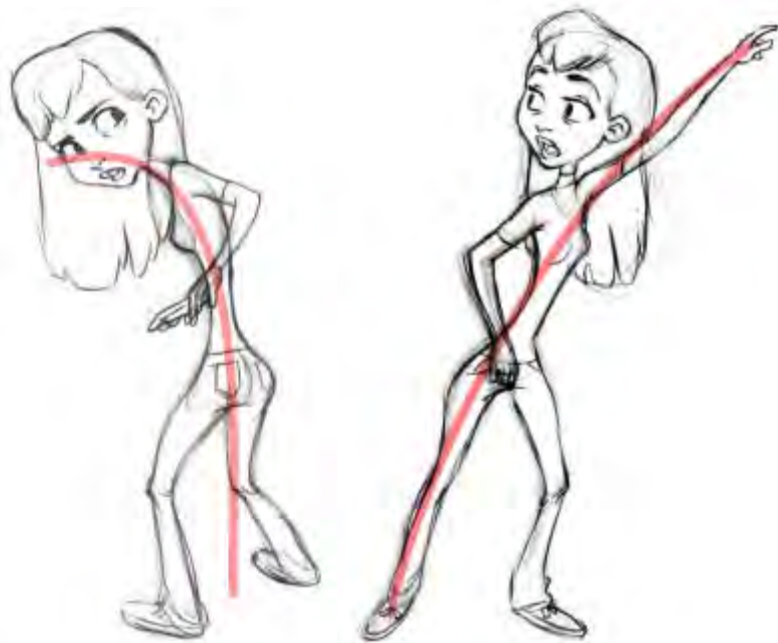
The **path of action** indicates the trajectory for a sequence of drawings in an animation.

Secondary Paths of Action

The path of action is usually associated with the primary motion but we can also consider paths of action for secondary motion, such as the motion of a character's hand, arm, foot, etc.

Primary
(Jump)

Secondary
(Arm swing)
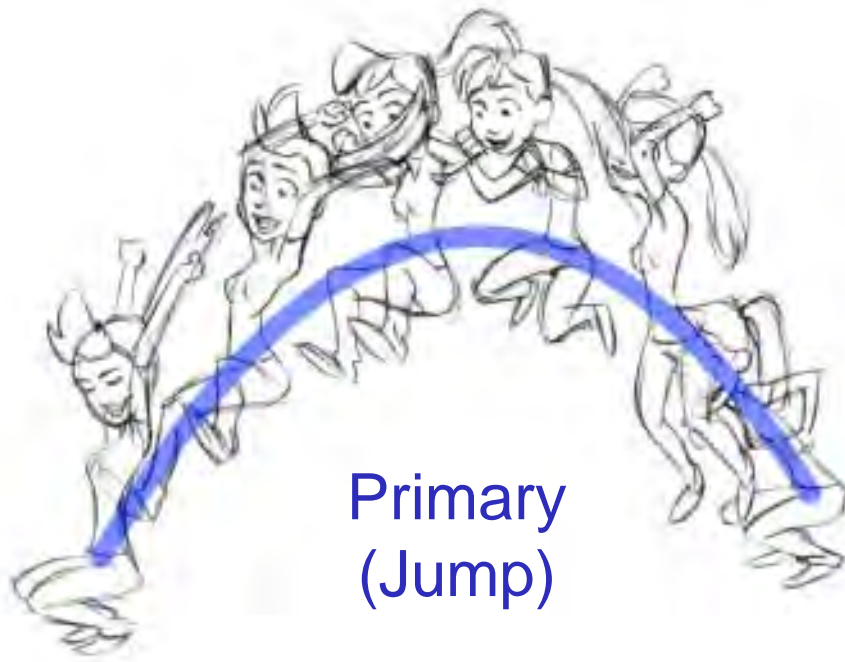
Parabolic Arcs

When gravity is the only force, the path of action is a *parabolic arc*.

Paths of action of a bouncing ball and a stream of water are parabolic arcs.

Water stream

Circular Arcs

Circular arcs are common since motion is often around a fixed pivot point, such as a joint.
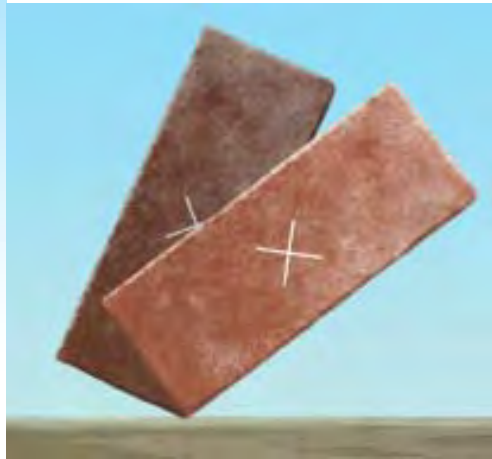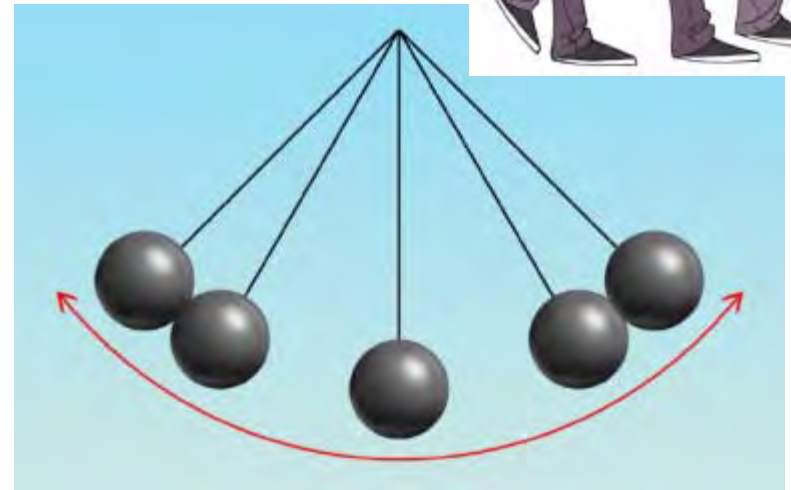
Tipping & Swinging

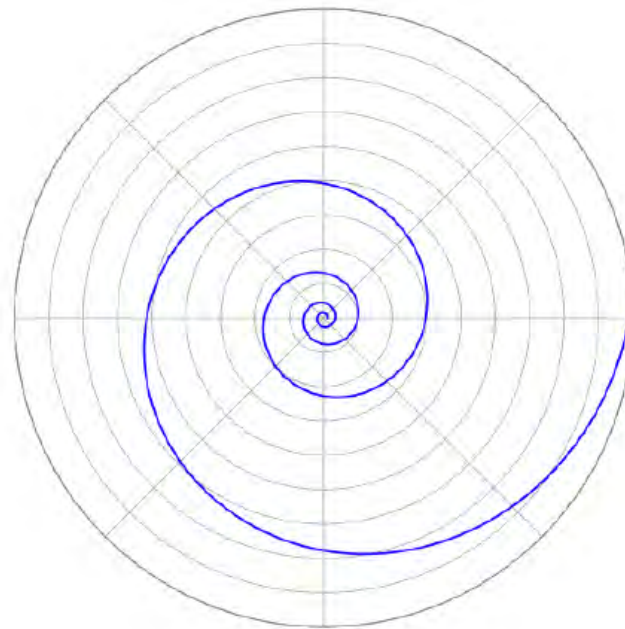Two common types of motion on circular arcs are tipping and swinging.

Tipping

Swinging

In both cases the path of action is a circular arc but the timing and spacing is very different.

Spirals Arcs

A spiral arc is a circular arc but with a radius that's either increasing (spiral out) or decreasing (spiral in).
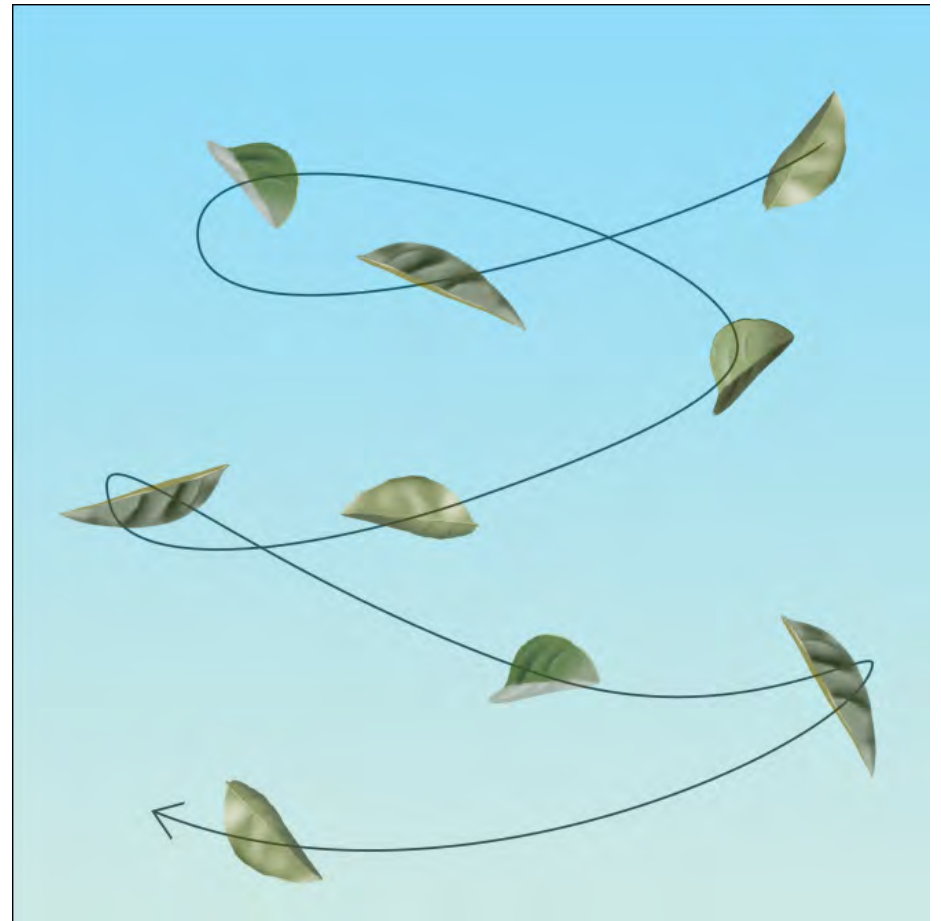
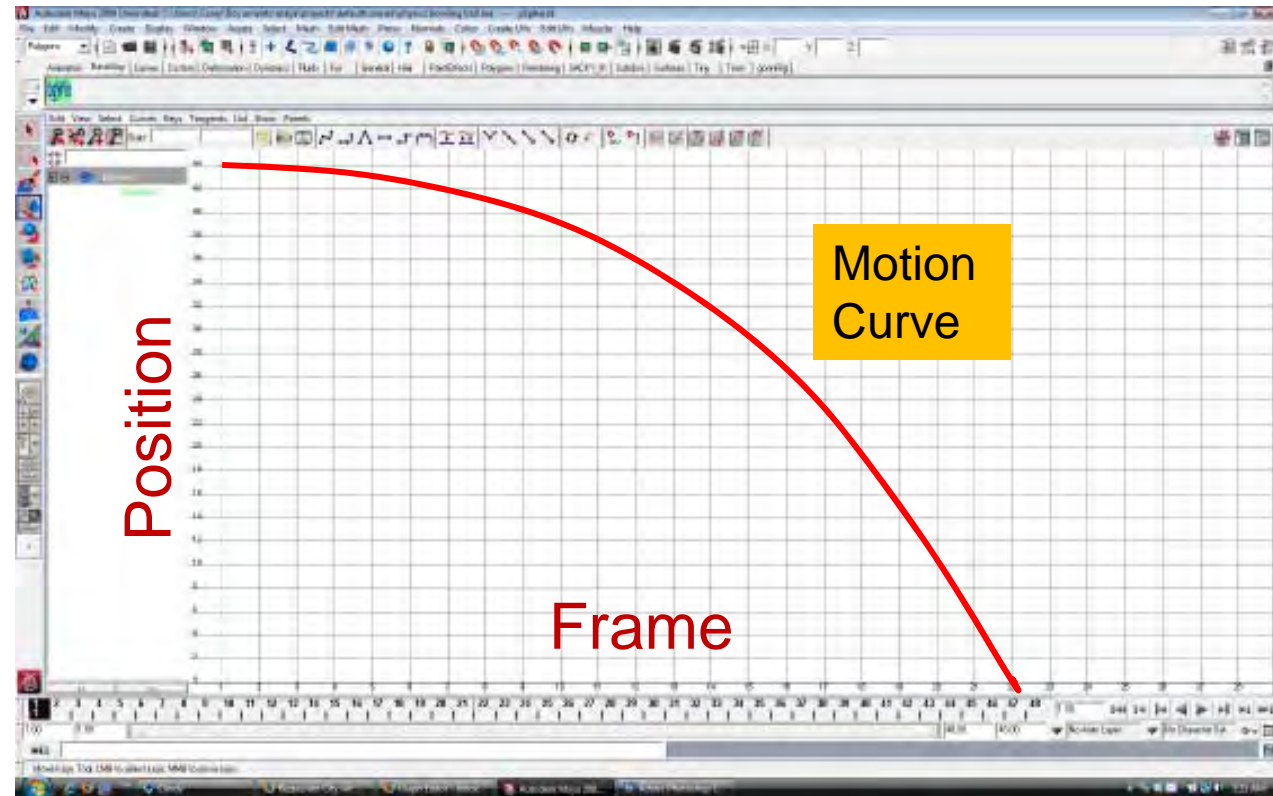Concept art from
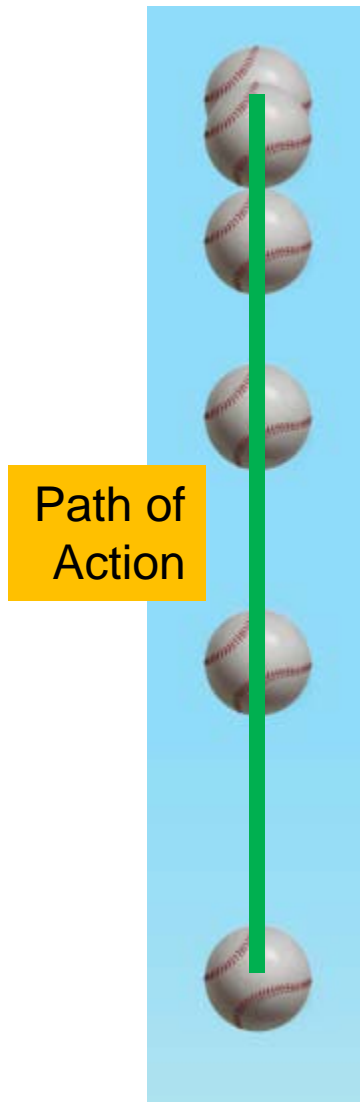*Pirates of the Caribbean 3*

Complex Motion

Complex motion is challenging to animate believably since the timing and spacing need to be consistent with the path of action.

Knowing the laws of motion will help.

Motion Curve and Path of Action

Path of Action

Position

Motion Curve

Frame

The motion curve in the graph editor is <u>not</u> the path of action.

Summary

- The path of action is the trajectory traced out by a moving object or character.
- Line of action is the "flow" of a drawing.
- Moving, falling objects often have a parabolic arc as a path of action.
- Circular arcs are another common path of action (e.g., tipping and swinging motion).
- Path of action is *not* the same as the motion curve in the graph editor.