Fourth Down at Half Time
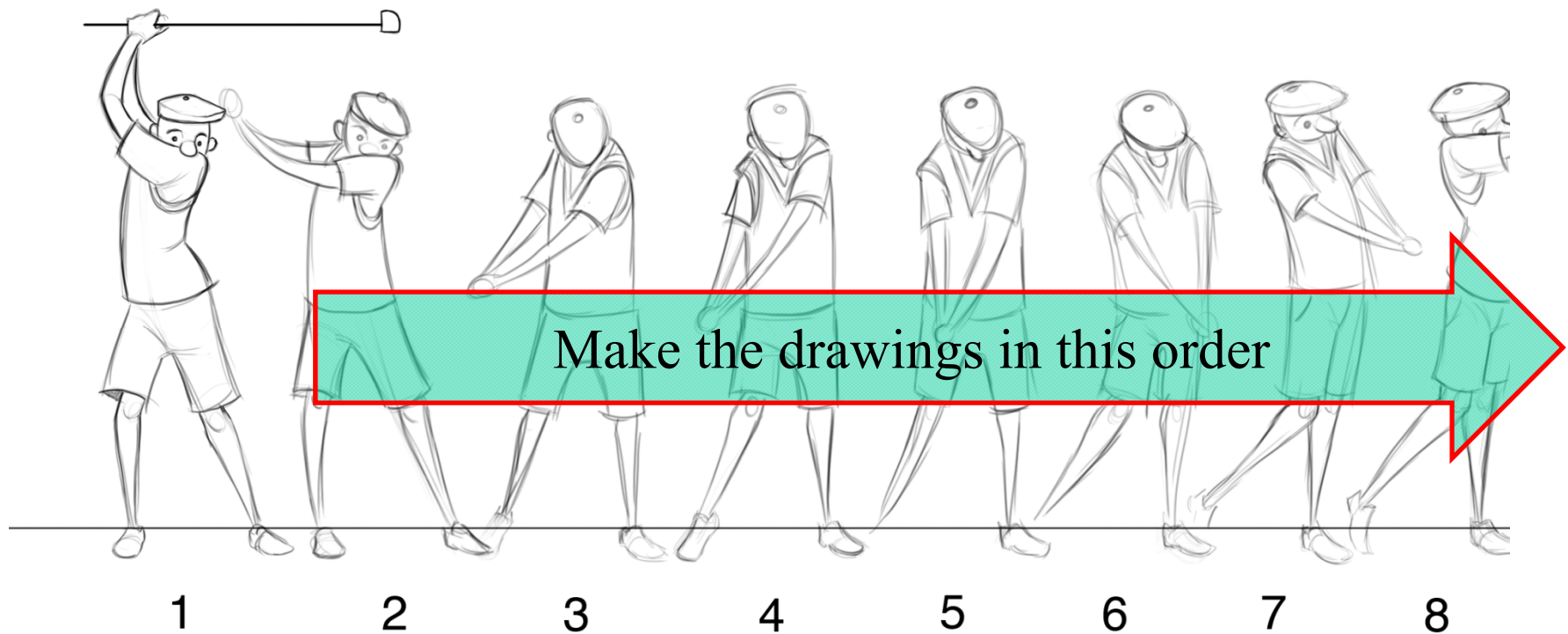
Animation
Physics

Straight Ahead Action

In Straight Ahead Action, you create the first drawing, then the second one, then the third, etc.

Make the drawings in this order

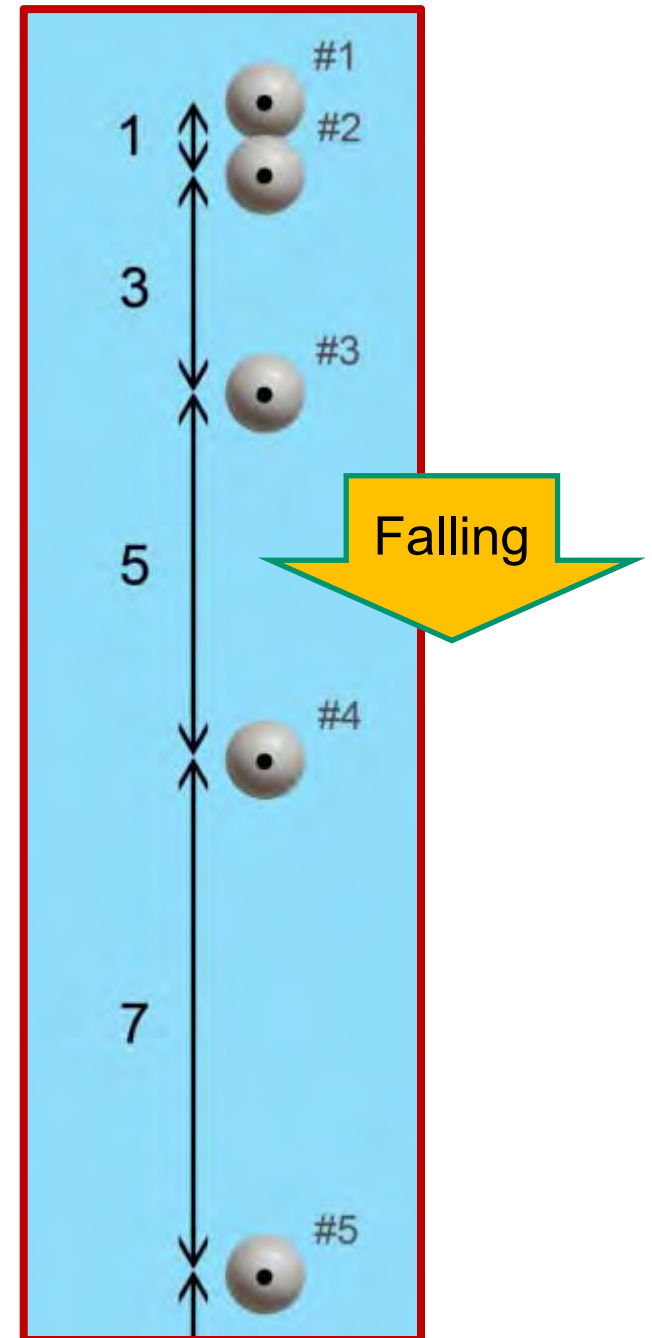1   2   3   4   5   6   7   8

This style of animation is expressive but it can be hard to plan the scene or to go back and adjust the timing.

The Odd Rule

"The Odd Rule" tells us that the spacings when slowing out from an apex follow a simple pattern of 1 : 3 : 5 : 7 :, etc.
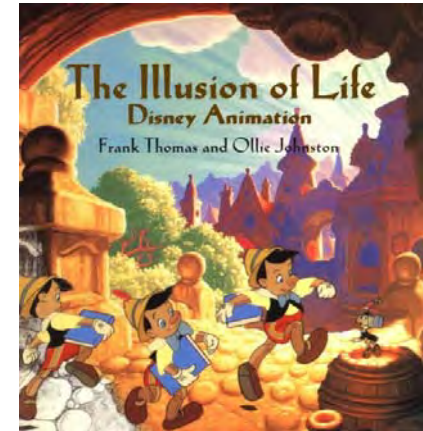
This rhythm is useful to have in mind when animating by Straight Ahead Action.

Principles of Animation

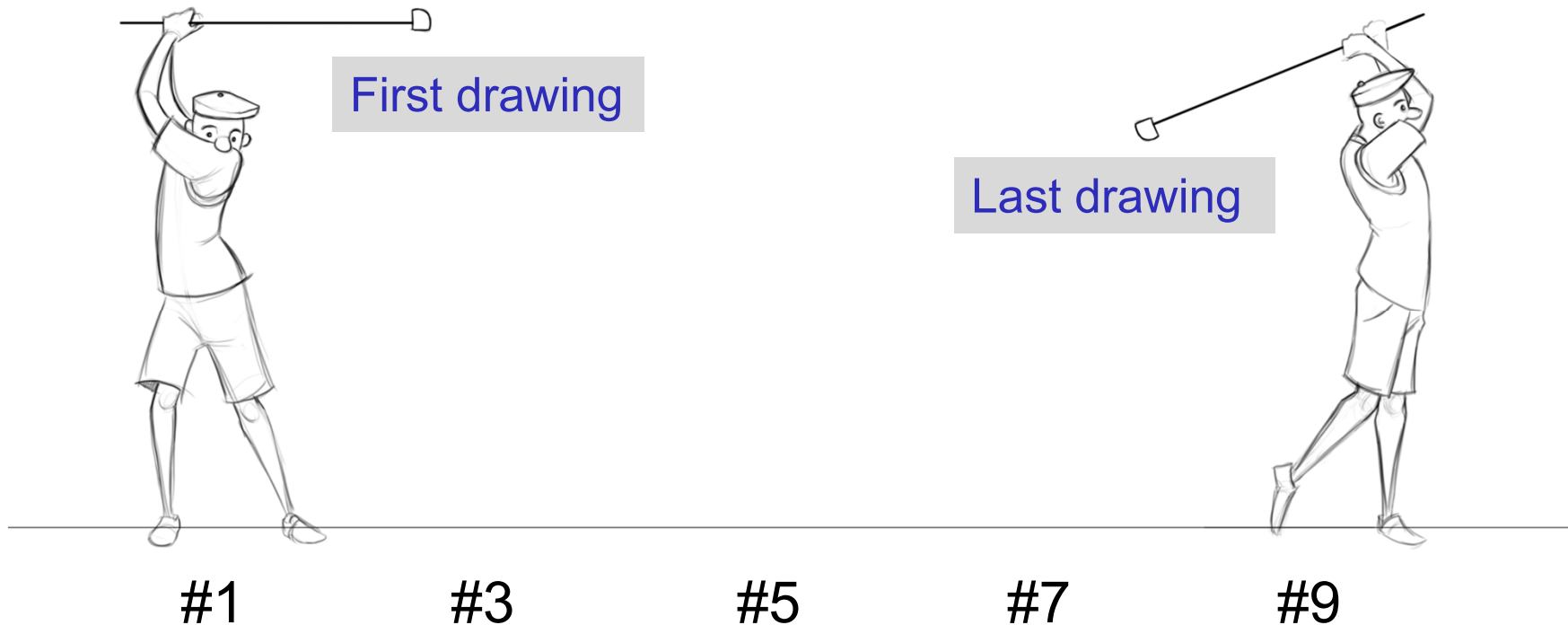A Principle of Animation is that there are two basic styles: Straight Ahead and Pose-to-Pose.

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
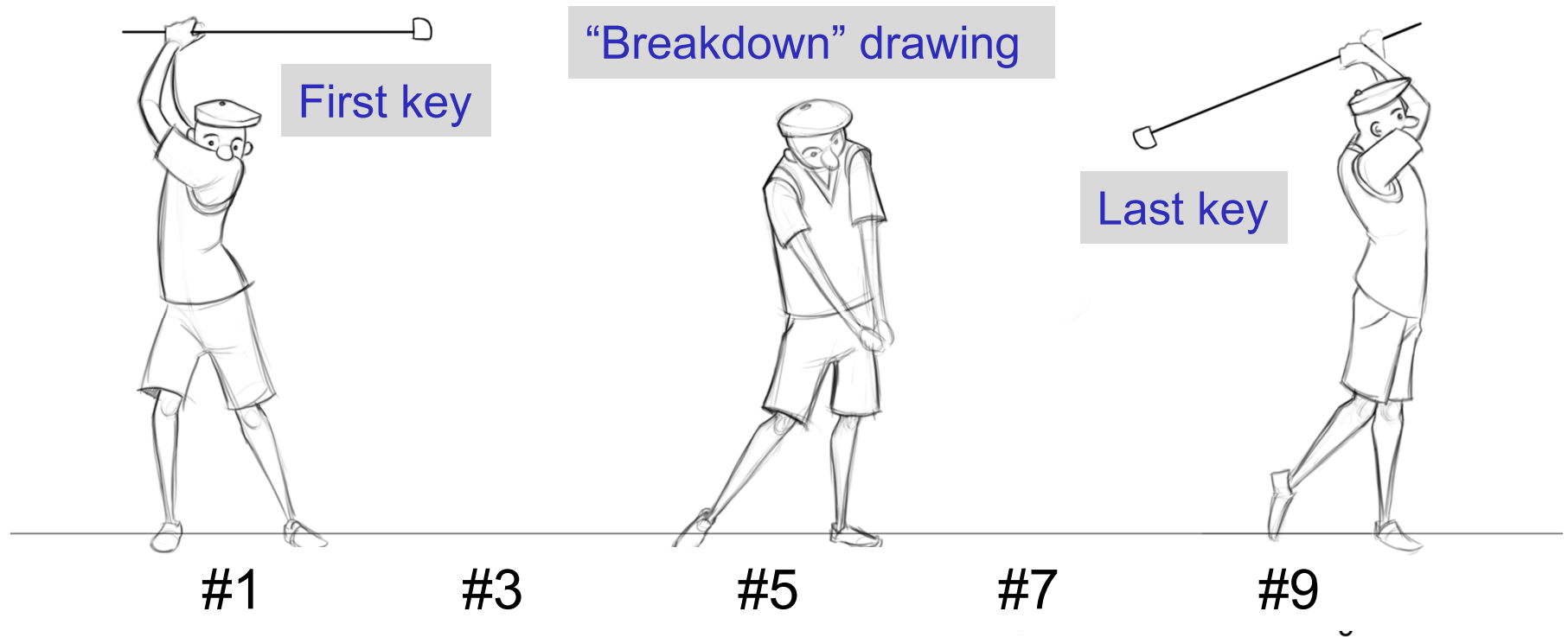
Pose-to-Pose Action

In Pose-to-Pose action, you start by creating the first and last key drawings.

First drawing

Last drawing

#1   #3   #5   #7   #9

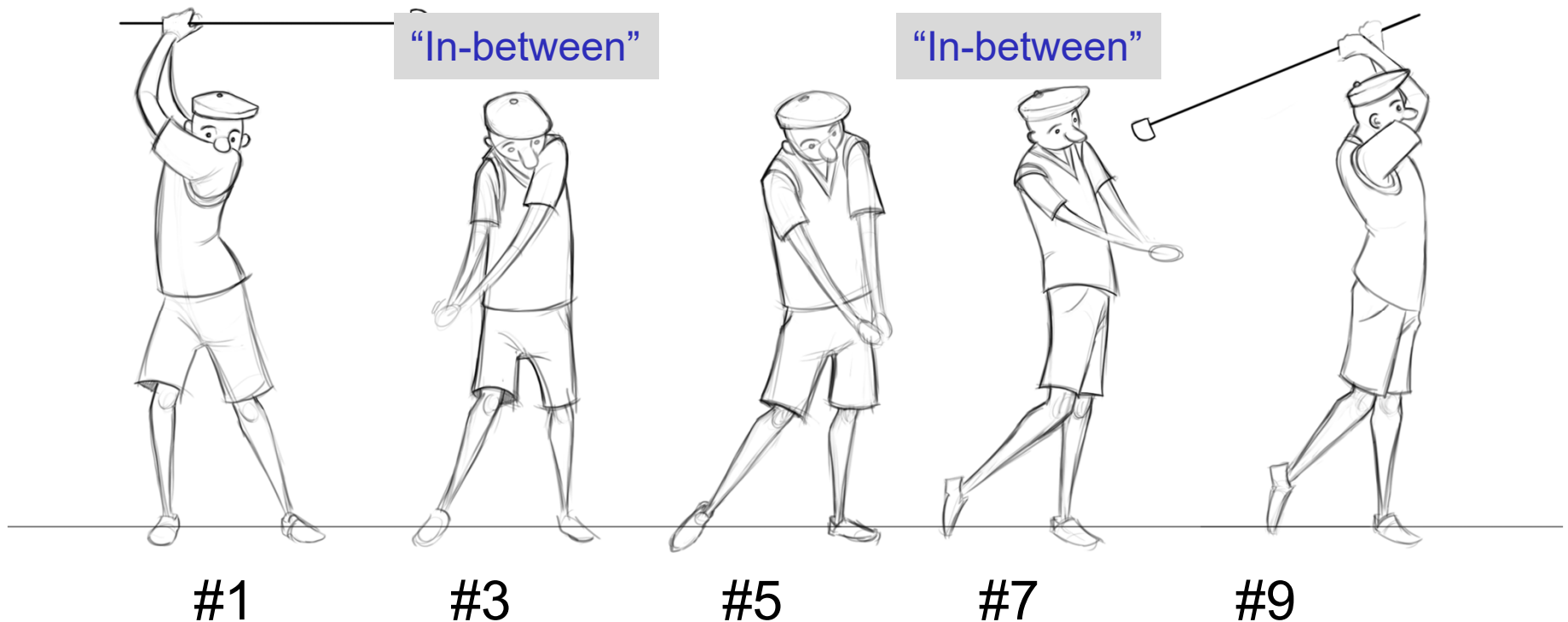You also decide how many drawings
to put in between the first and the last.

Pose-to-Pose Action (cont.)

Next, you create the "breakdown" drawing, which goes half-way in time between the first and the last drawings.

"Breakdown" drawing

First key

Last key

#1   #3   #5   #7   #9

Pose-to-Pose Action (cont.)

Finish by creating any remaining "in-between" drawings.

"In-between"   "In-between"

#1   #3   #5   #7   #9

Pose-to-Pose Action is less spontaneous than Straight Ahead but it's easier to plan a scene from start to finish.
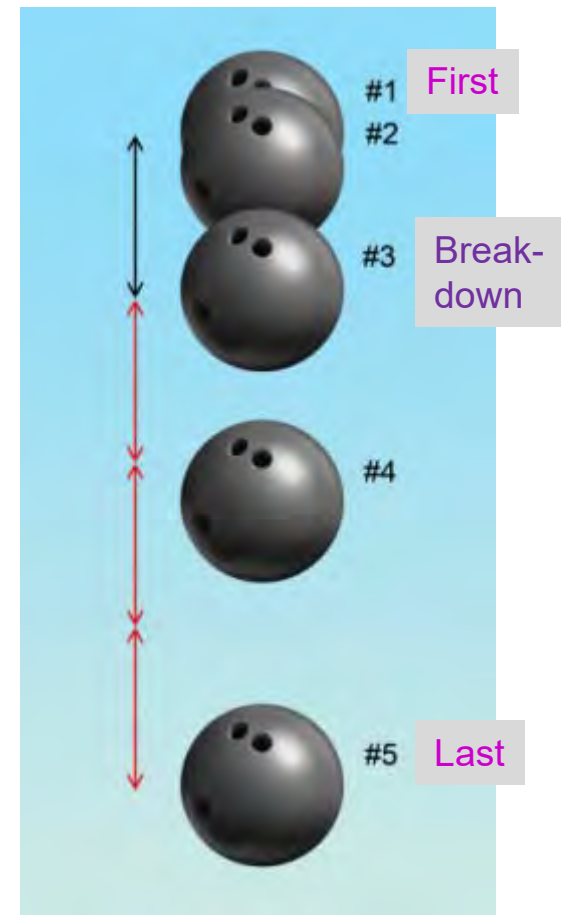
"Fourth Down at Half Time" Rule

The "Fourth Down at Half Time" rule says that for falling motion the break-down drawing is a fourth of the distance from the apex.

Fourth Down

In <u>space</u>, Key #3 is a fourth of the way down between #1 and #5.

At Half Time

In <u>time</u>, Key #3 is half-way between #1 and #5.

#1 First
#2
#3 Break-down
#4
#5 Last

Ball drop
"Shot on Threes"
(3 frames per drawing)

Video Reference for FD@HT

Frame 57 (Apex)   Frame 62   Frame 67

5 frames   5 frames

"Fourth Down at Half Time" Rule

3 frames per drawing (close-up)

- #1 — First
- #2
- #3 — Break-down
- #4
- #5 — Last

6 frames per drawing (medium shot)

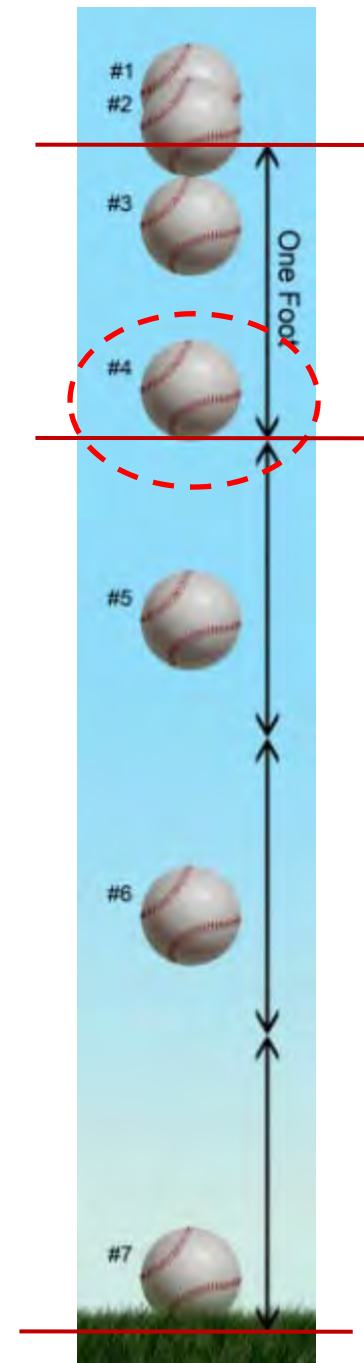- #1 — First
- #2
- #3 — Break-down
- #4
- #5 — Last

Fourth Down at Half Time gives you the position of the break-down drawing regardless of the number of frames per drawing.
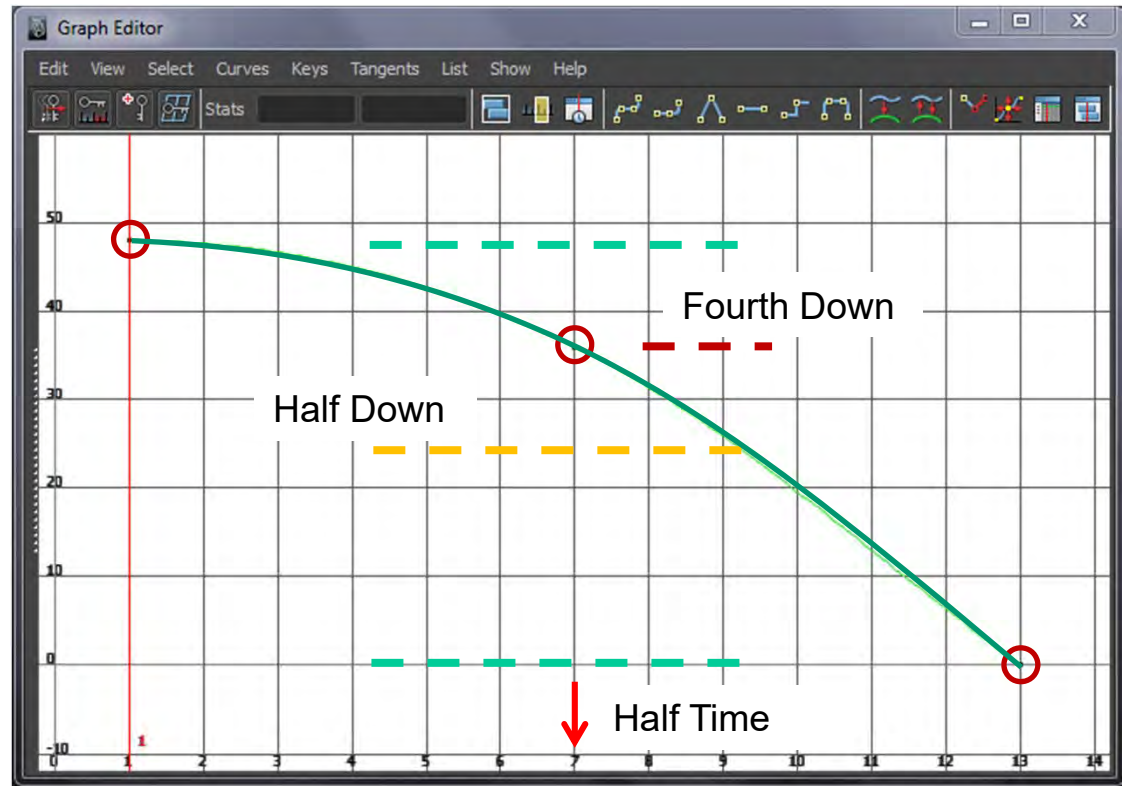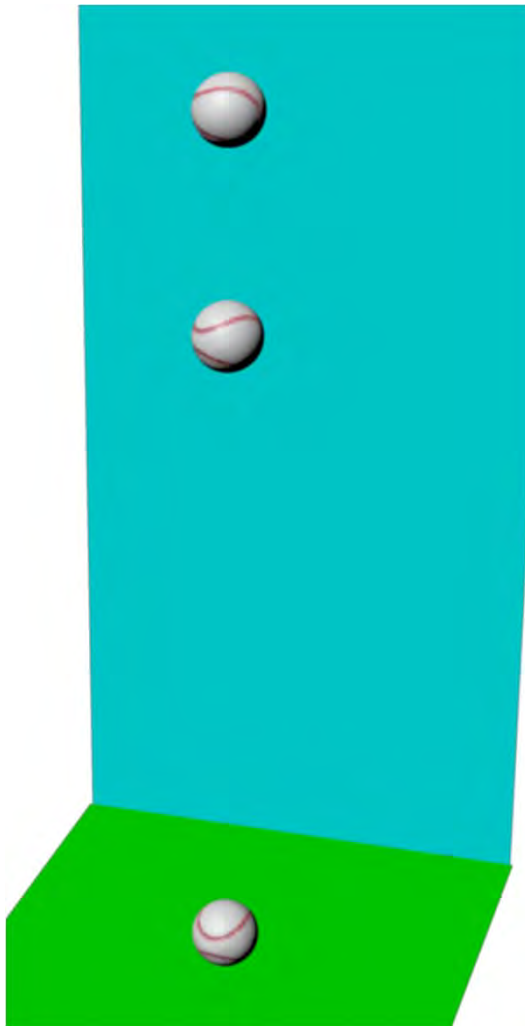
Ball Drop Example

Ball drop from a height of 4 feet, shot on twos (2 frames per key).

Key #4 is the break-down key (half way between #1 & #7).

The distance from the apex (#1) to the break-down (#4) is 1 foot since that is a quarter of the distance from the apex to the bottom.
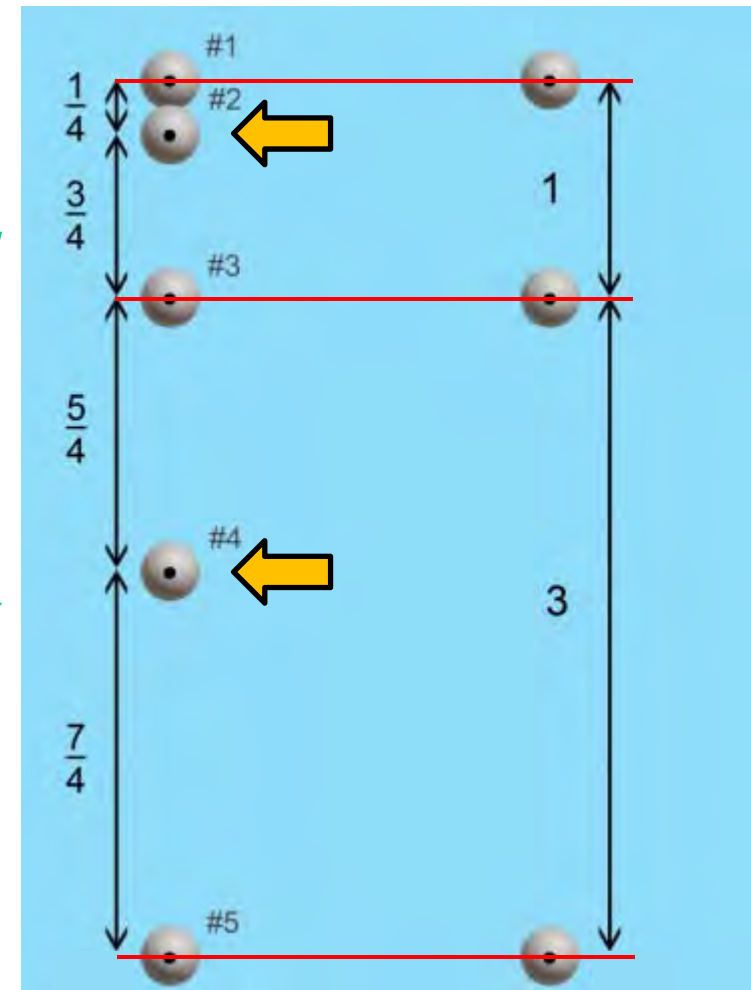
FD@HT in the Graph Editor

In computer animation the FD@HT rule is easy to use in the graph editor.

Drawing the In-Betweens

Here is one way to draw the in-betweens for Fourth Down at Half Time:

* For the top spacing the in-between is a fourth of the distance from the apex.

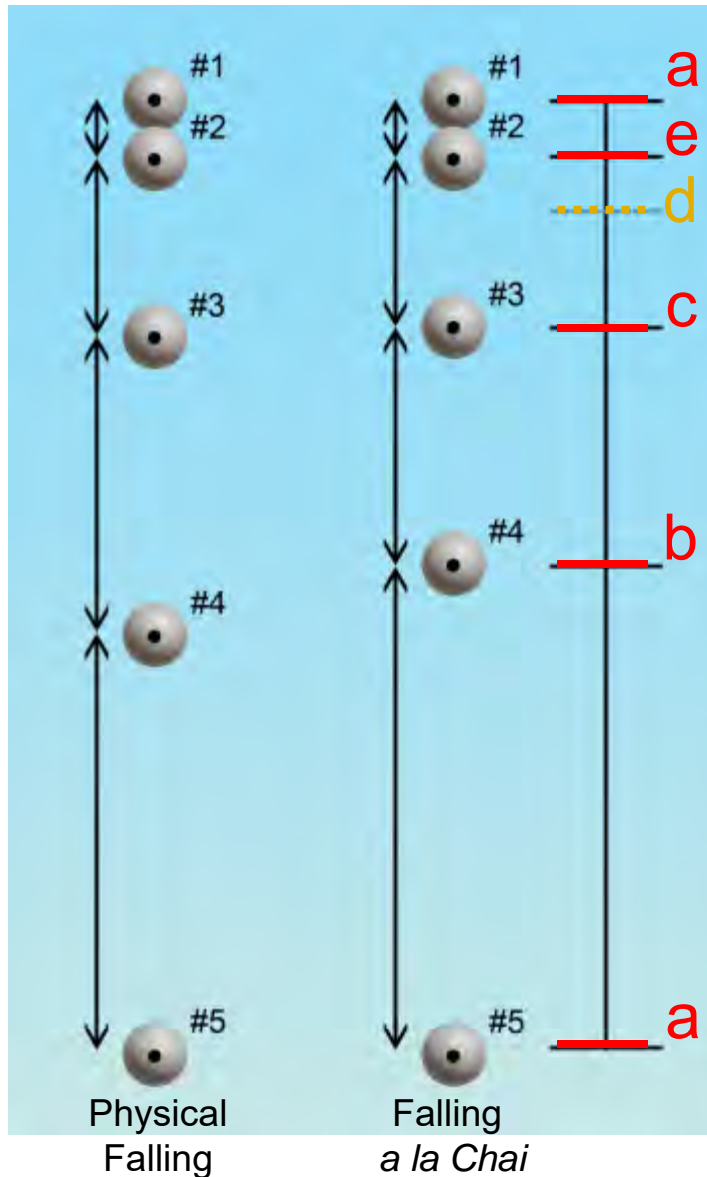* For the bottom spacing the in-between is a little above the center of that spacing.

FD@HT with In-Betweens
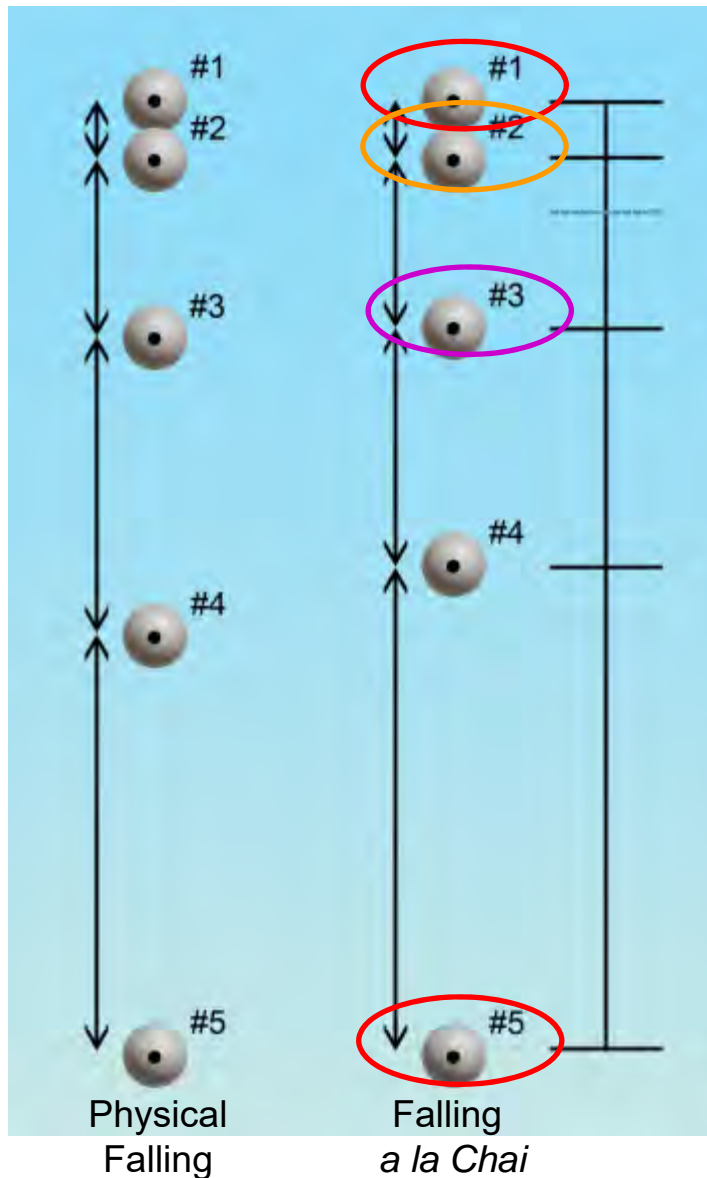
FD@HT

Falling *a la Chai*

Prof. Dave Chai
Animator

Another way to draw the in-betweens is to use the "Falling *a la Chai*" recipe:

a) Draw interval from first & last keys.
b) Divide interval in half. Mark a key
c) Divide top part in half. Mark a key.
d) Divide top part in half. Skip
e) Divide top part in half. Mark a key.

Key #4 is a bit too high but no one will notice.

#1 #2 #3 #4 #5 a e d c b a

Physical
Falling

Falling
a la Chai

Falling *a la Chai* (cont.)

Physical
Falling

Falling
a la Chai

Falling *a la Chai* uses Fourth Down at Half Time.
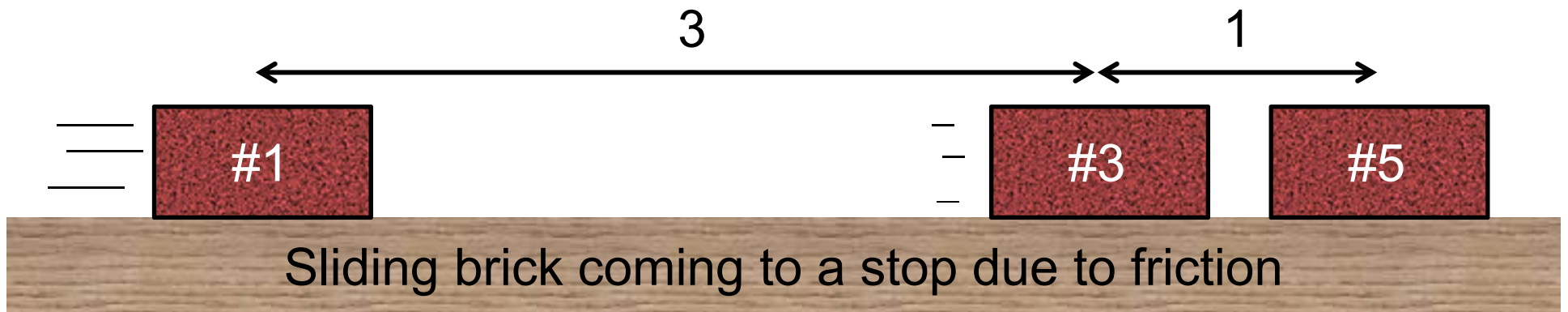In fact, it uses it twice.

Key #3 if a fourth of the distance down and is half-way in time between keys #1 and #5

Key #2 if a fourth of the distance down and is half-way in time between keys #1 and #3

Slowing In or Out & FD@HT

Fourth Down at Half Time applies whenever the acceleration or deceleration is constant.

Sliding brick coming to a stop due to friction

FD@HT applies if The Odd Rule applies, which it often does for slowing in or out.

Summary

- In Pose-to-Pose animation the first and last keys are fixed, then the breakdown and in-between keys are filled in.
- The "Fourth Down at Half Time" Rule (FD@HT) says that the breakdown key is a fourth of the way down from the apex.
- "Falling a-la-Chai" is an extension of FD@HT for estimating in-between keys.
- FD@HT applies if The Odd Rule applies, which it often does for slowing in or out.