

Jumping Implementation in Video Games

Jumping is a **single** action allowing for **limited, controllable** aerial motion.

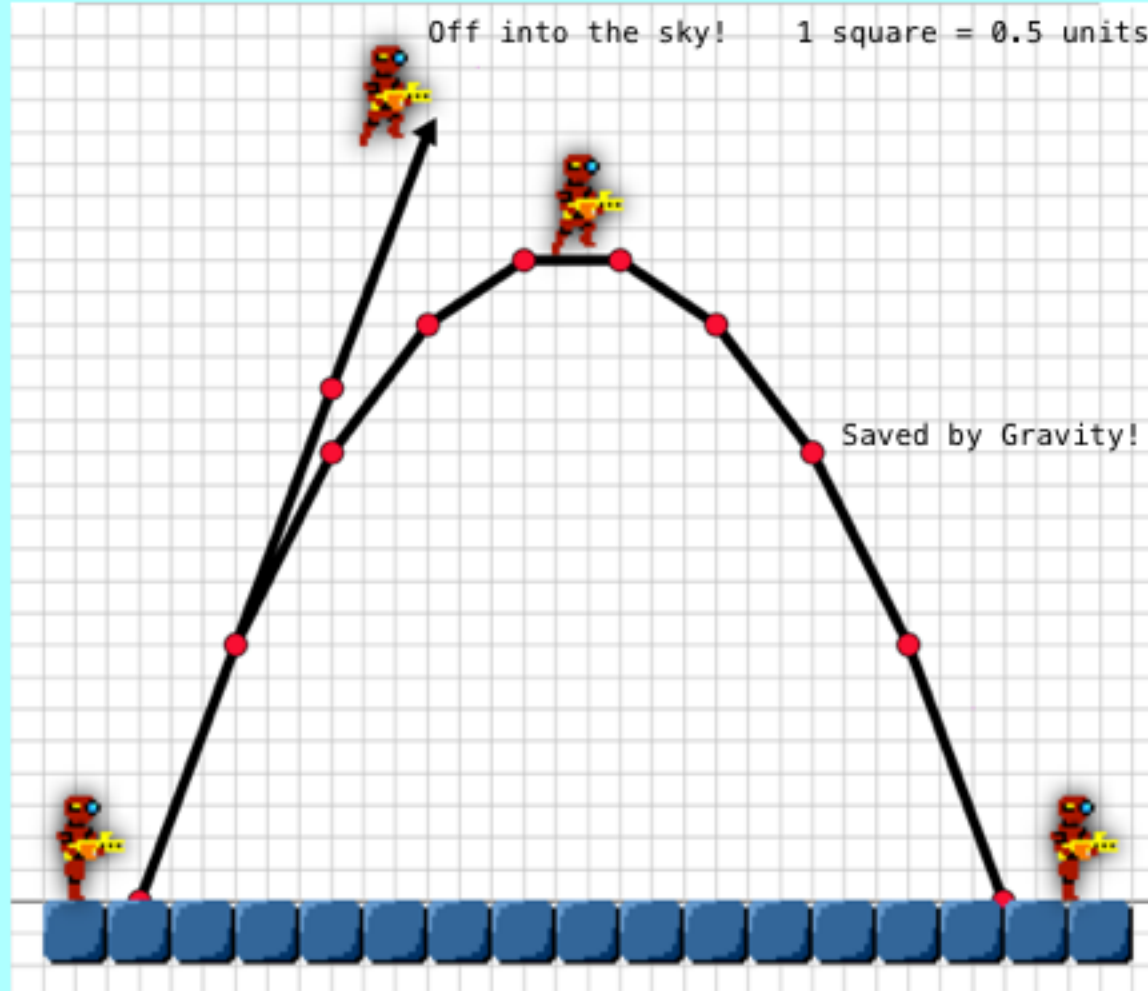
Flight is controllable, and it can be limited with a time limit, but it is a continuous action, not a single, discrete one. Jumping is a way of achieving limited, controllable aerial motion in a single action.

Video games usually ignore or completely rewrite the laws of physics, but video game jumping is built around a basic physical principle:

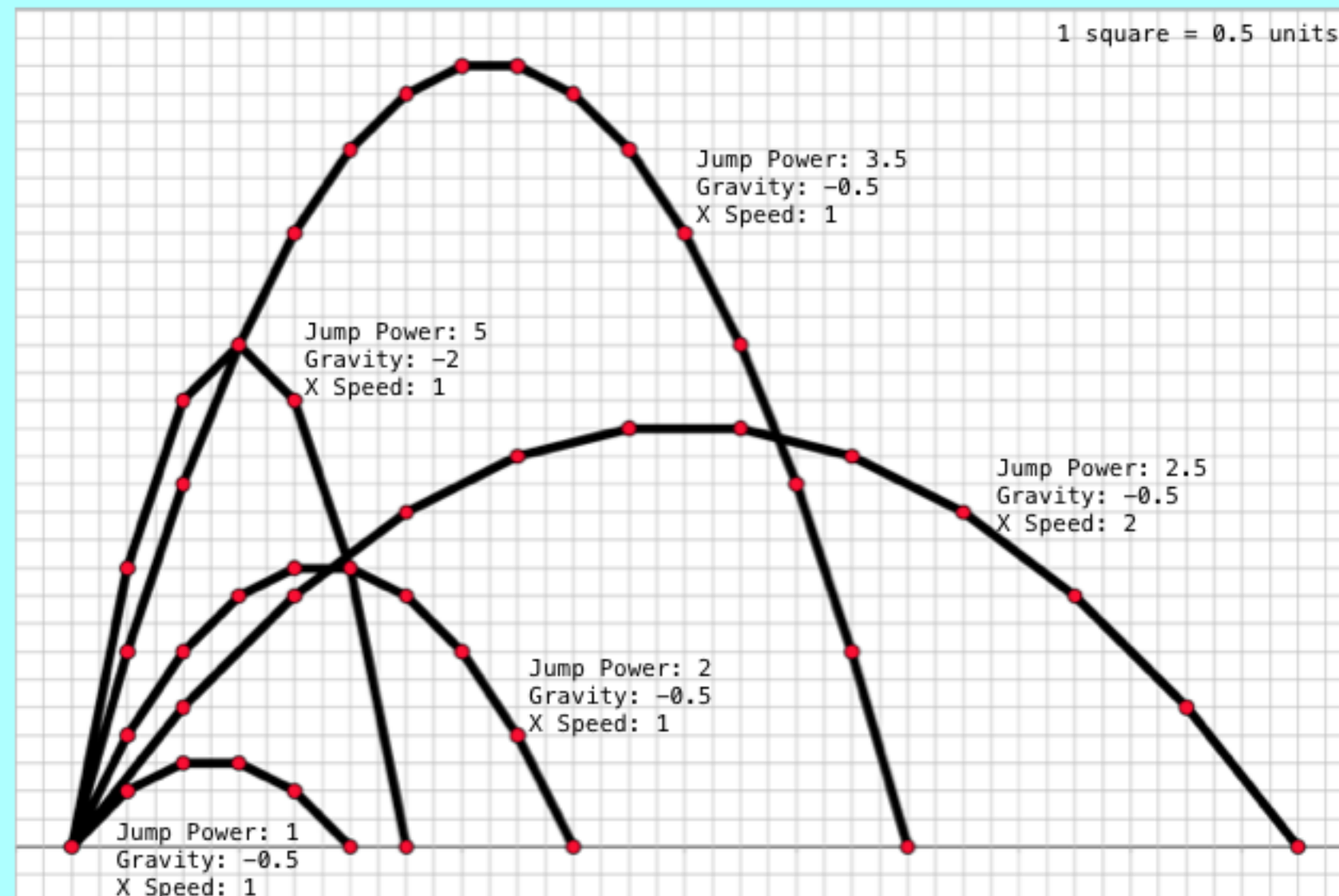
upward impulse (Jump Power) VS the constant downward force of Gravity

If there were no Gravity, then the player would fly upward indefinitely.

Gravity creates the **parabolic arch** of the jump.



Jump Power and Gravity help **limit** the jump. Along with the player's maximum horizontal speed, they define how high you can jump and how far you can travel while jumping.



But how do players control the jump?

Jump Canceling allows for control of vertical motion (i.e. the height of the jump itself, the apex). A jump is canceled by releasing the [A] button (the traditional jump button) while ascending. Releasing [A] halts or severely reduces the upward motion, allowing the player a range of possible jump heights.

Full Canceling: releasing the A button immediately sets the upward speed to 0. The player behaves as if he has reached his apex.

Partial Canceling: releasing the A button severely reduces the upward speed to 0 over a short period of time. This is usually done by increasing Gravity when the A button is released.

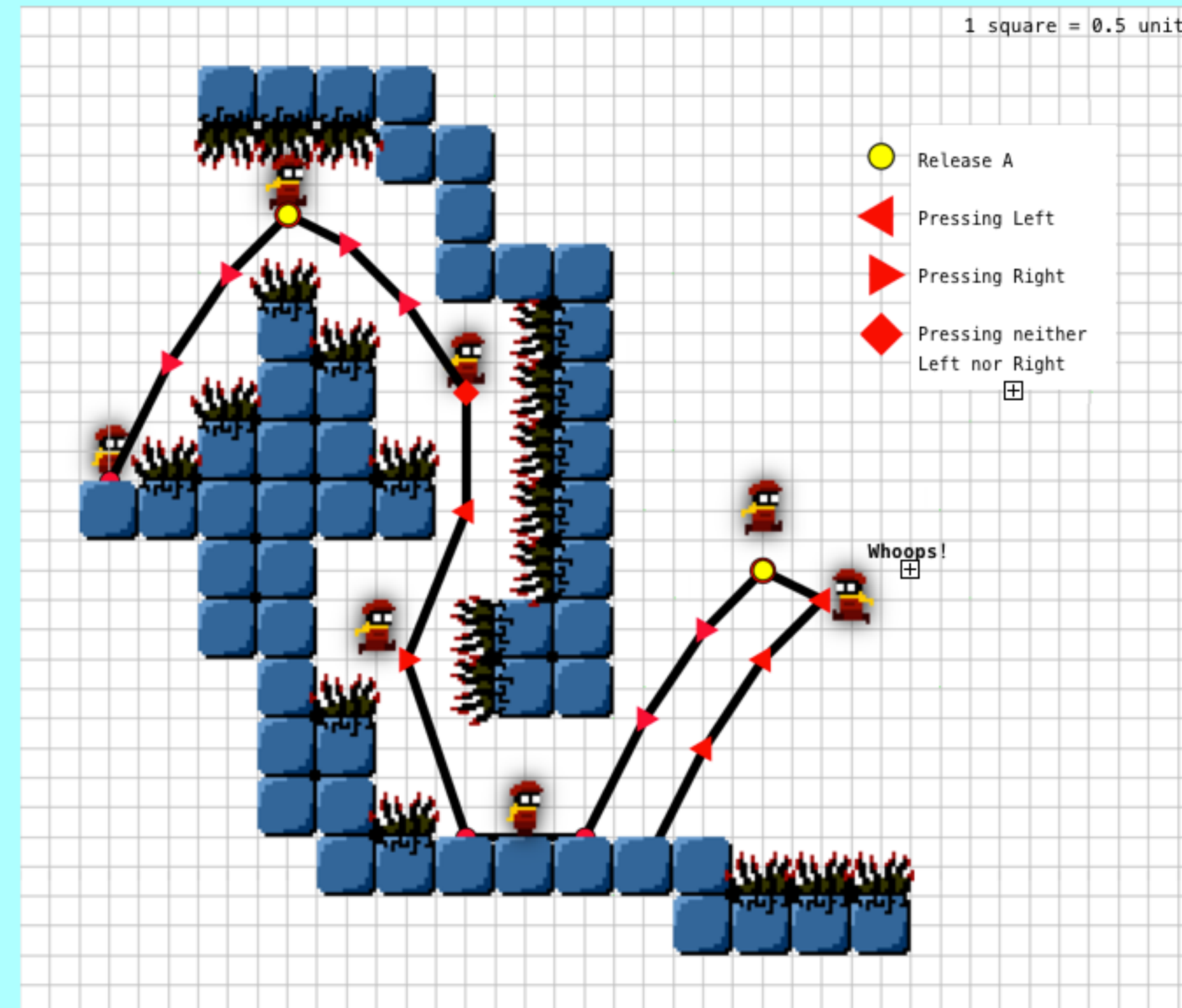
Horizontal Inertia determines the amount of control the player has over horizontal motion.

0% inertia means the player can stop instantly and can turn on a dime. Current motion has no influence on stopping or reversing.

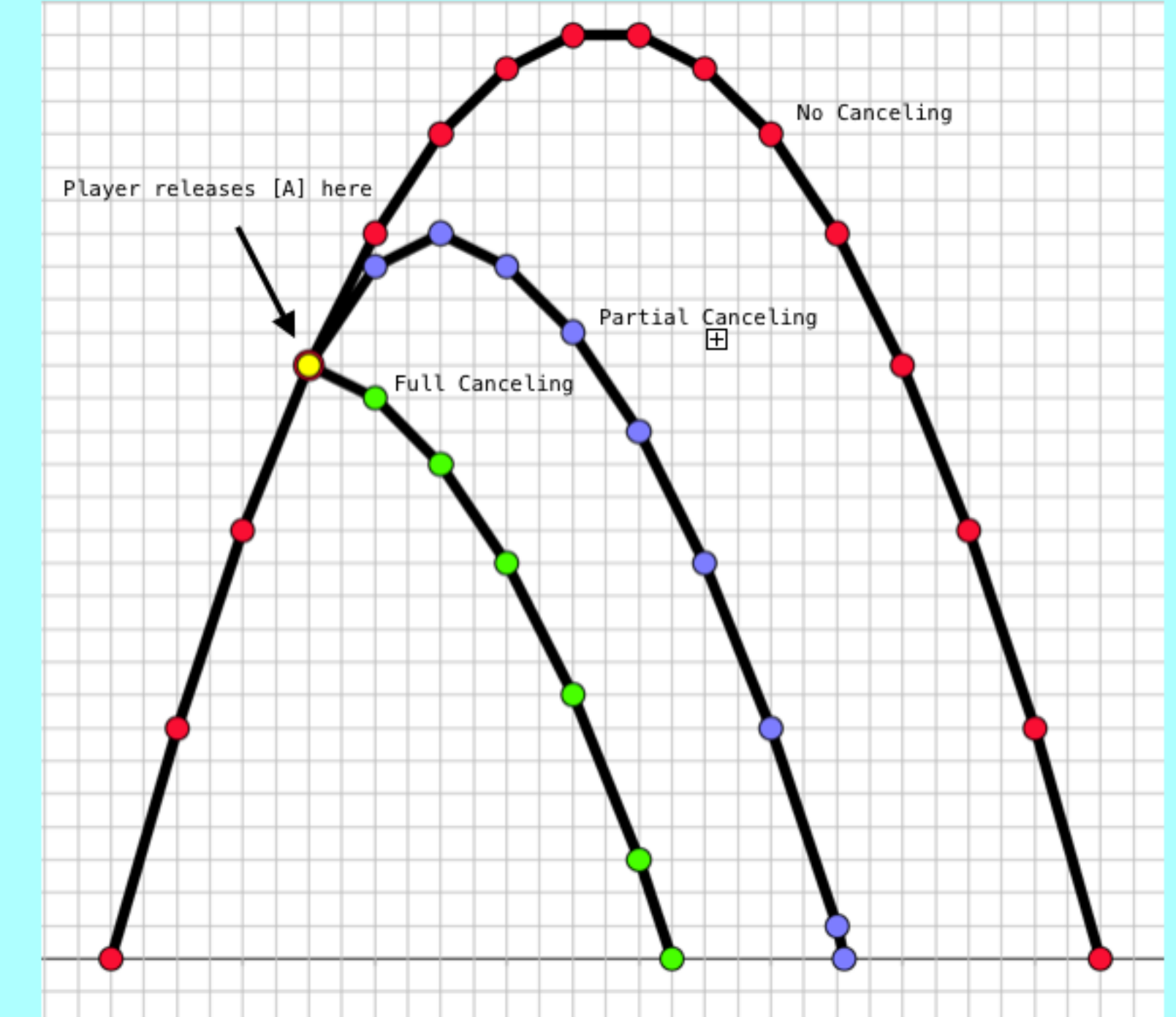
100% inertia means that the player will not slow down at all if he releases the horizontal controls, and it also means that reversing direction in midair is much more difficult.

Horizontal Inertia and Jump Canceling can significantly influence the "feel" of the jump.

Full Canceling and low Horizontal Inertia result in sharp motions and immediate response to input.



Jump Power, Gravity, and Maximum Horizontal Speed set the limits of the jump. Jump Canceling and Horizontal Inertia allow for control within these limits.



Partial Canceling and high Horizontal Inertia result in smoother motions and more natural, intuitive control.

