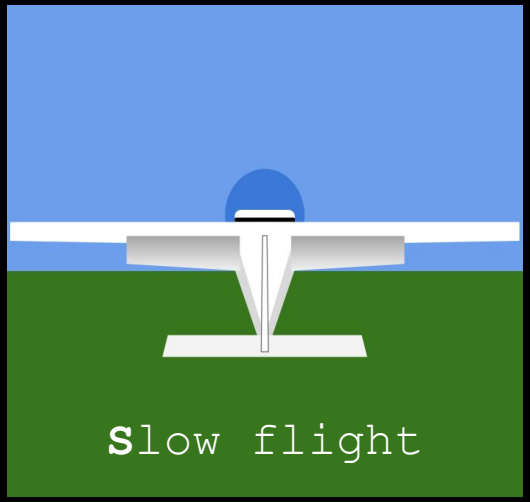
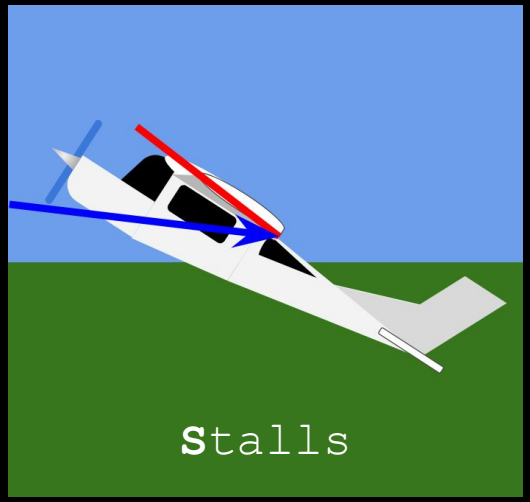
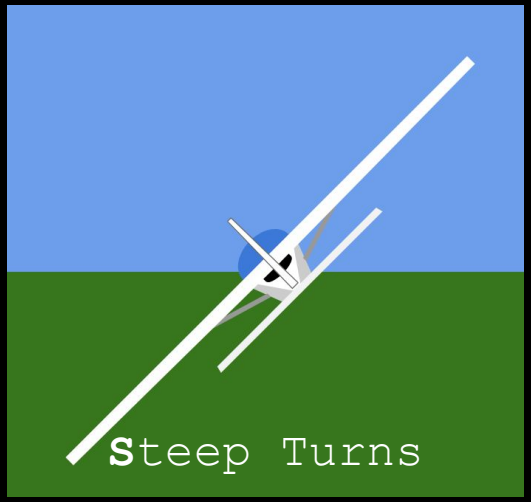






#3

Visual Cues of the 3S's

Made by Michael Tet

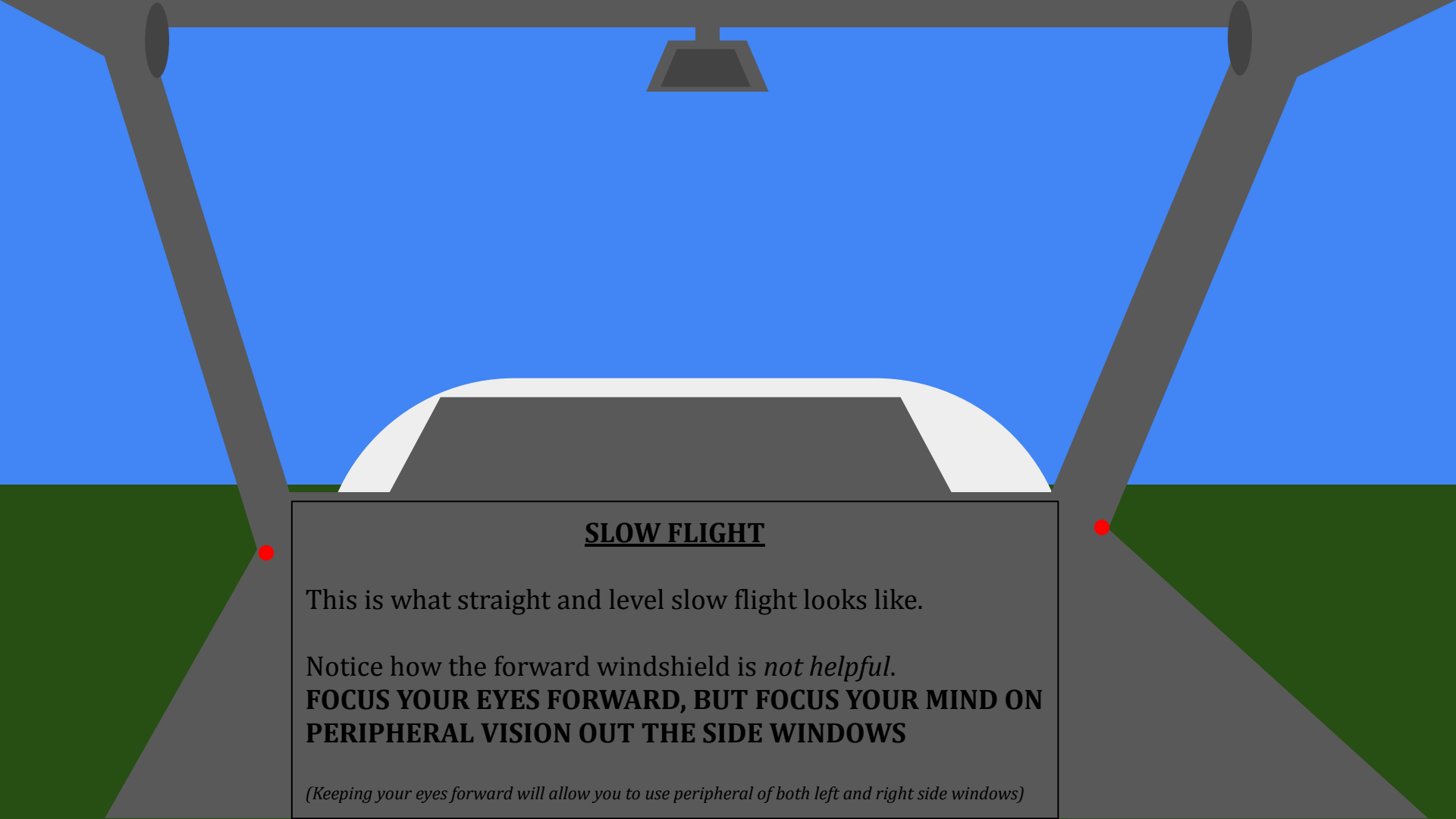
Lesson flow:

Read Visual Cues #1,#2, and #3 before reading this one!

In this lesson. . .

- Slow Flight
- Stalls
  - Power OFF stall
  - Power ON stall
- Steep Turns

Exercise - PITCH

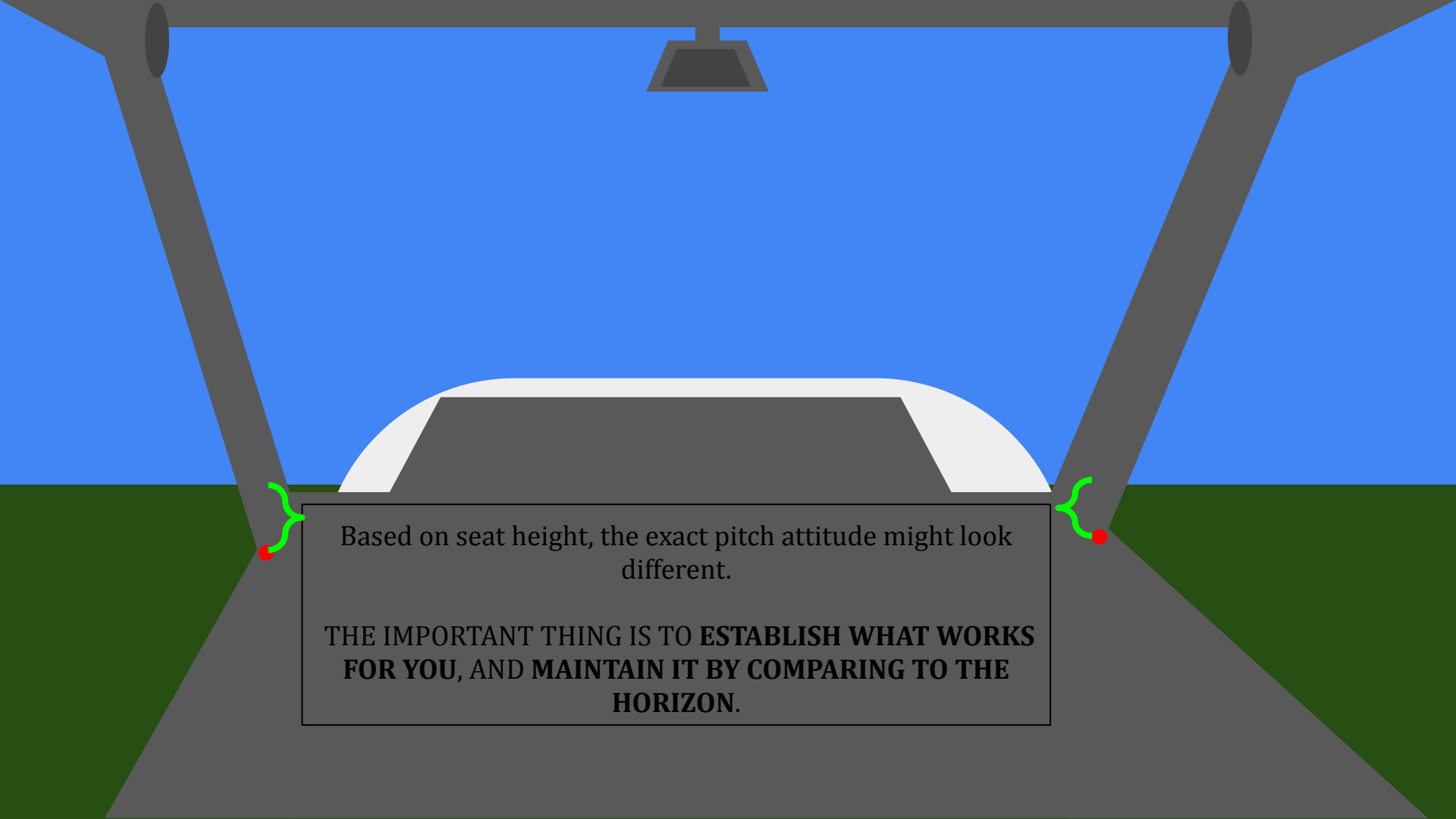


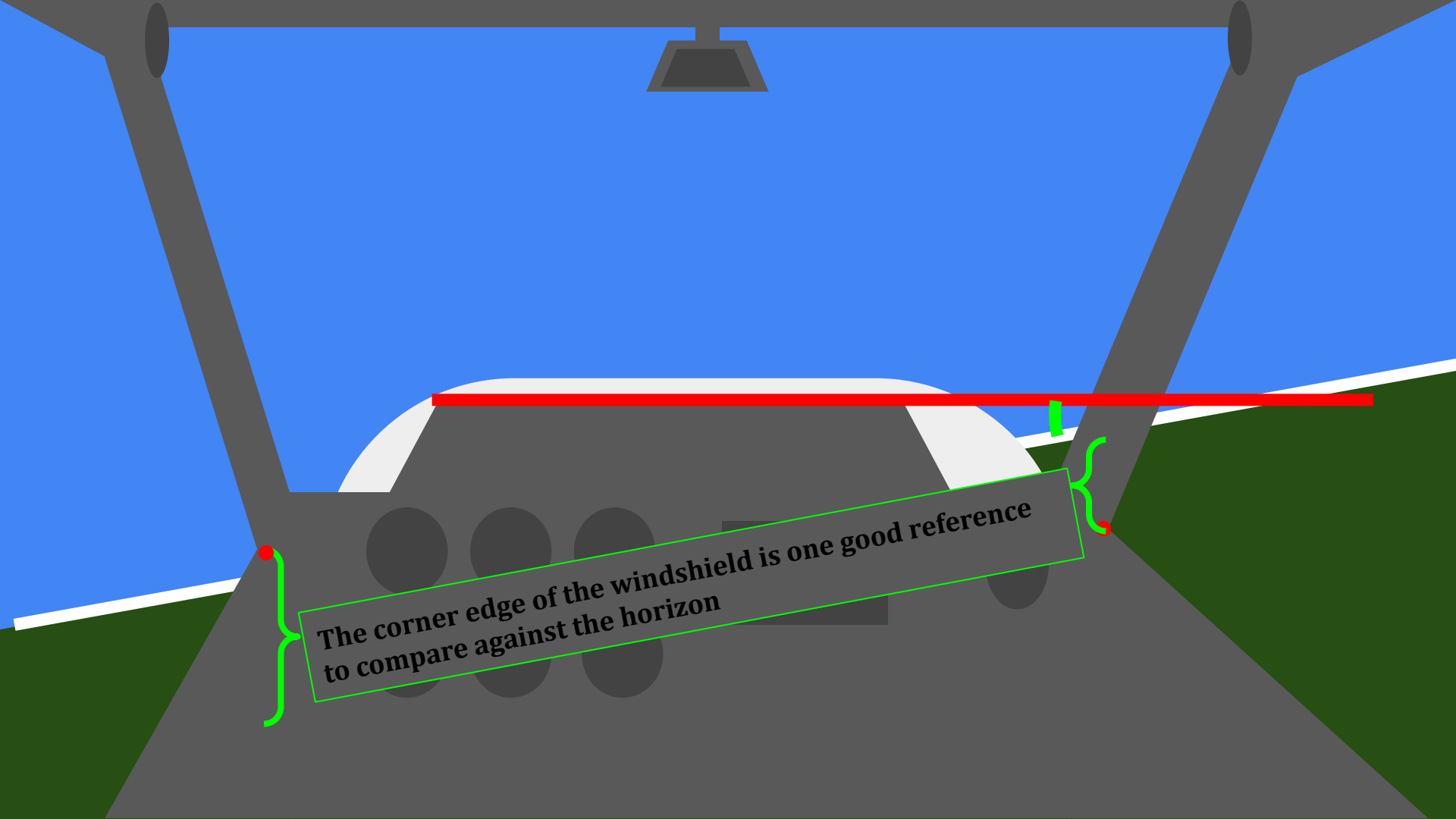
SLOW FLIGHT

This is what straight and level slow flight looks like.

Notice how the forward windshield is *not helpful*.
FOCUS YOUR EYES FORWARD, BUT FOCUS YOUR MIND ON PERIPHERAL VISION OUT THE SIDE WINDOWS

(Keeping your eyes forward will allow you to use peripheral of both left and right side windows)


Based on seat height, the exact pitch attitude might look different.
THE IMPORTANT THING IS TO **ESTABLISH WHAT WORKS FOR YOU**, AND **MAINTAIN IT BY COMPARING TO THE HORIZON**.


The corner edge of the windshield is one good reference
to compare against the horizon

Only a small bank is needed in slow flight to turn quickly.

120 knots

$$R = \frac{V^2}{11.26 \times \text{tangent of bank angle}}$$

$$R = \frac{120^2}{11.26 \times \text{tangent of } 30^\circ}$$

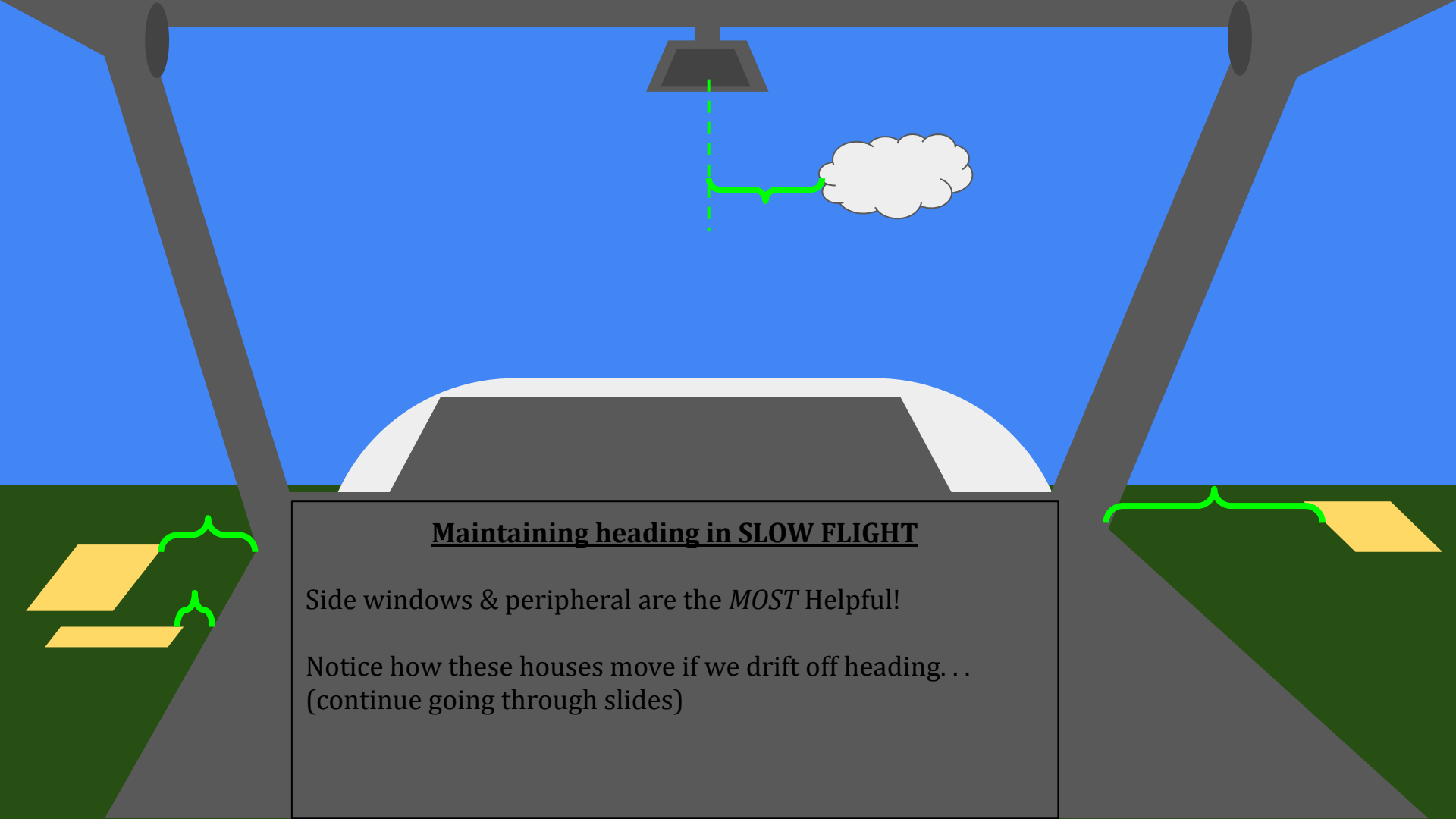
$$R = \frac{14{,}400}{11.26 \times 0.5773}$$

$$R = 2{,}215 \text{ feet}$$

The radius of a turn required by an aircraft traveling at 120 knots and using a bank angle of 30° is 2,215 feet

Big formula simply means. . .

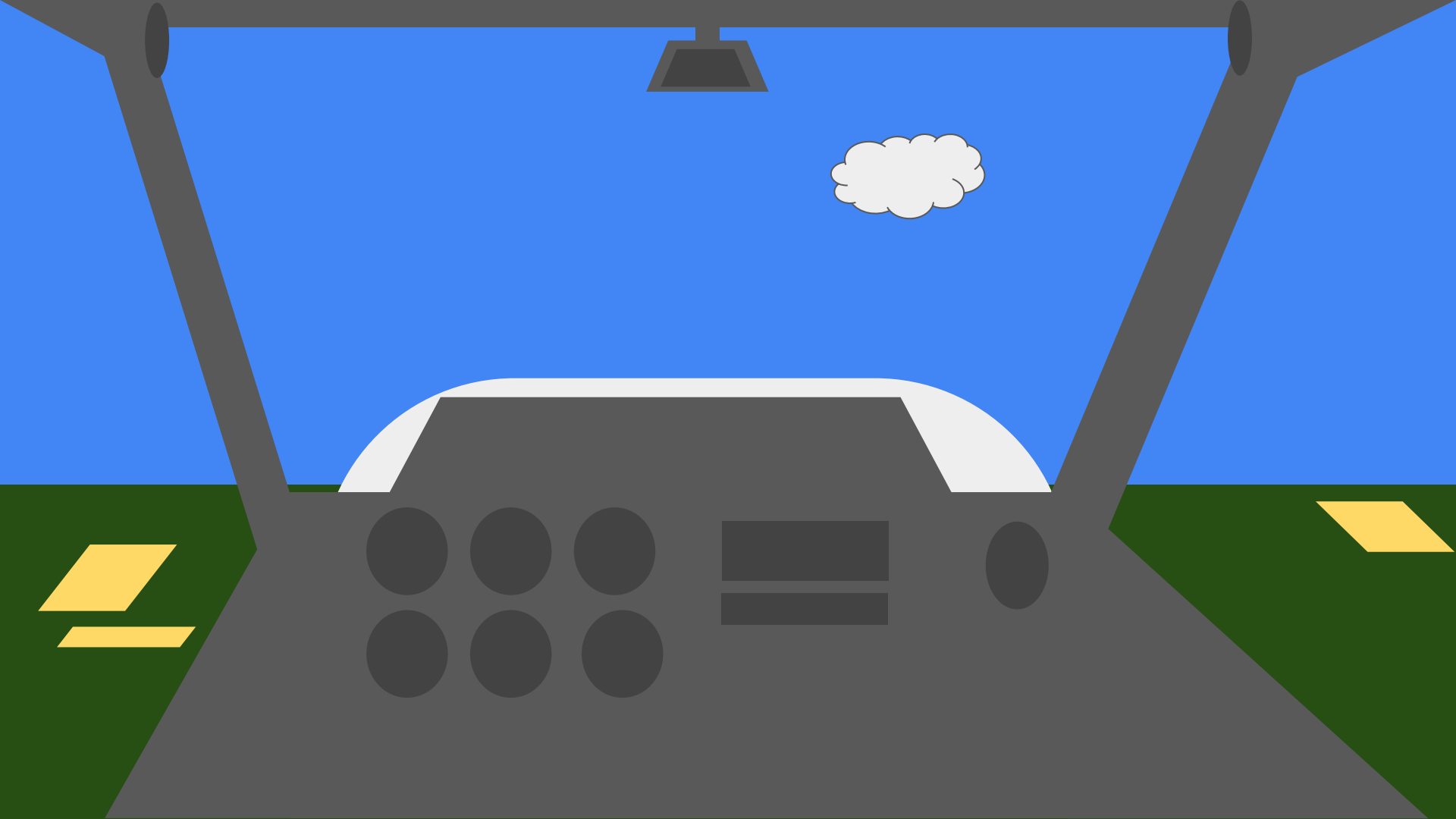
Fast speed = big turn radius *(slow turn rate)*
Slow speed = small turn radius *(fast turn rate)*

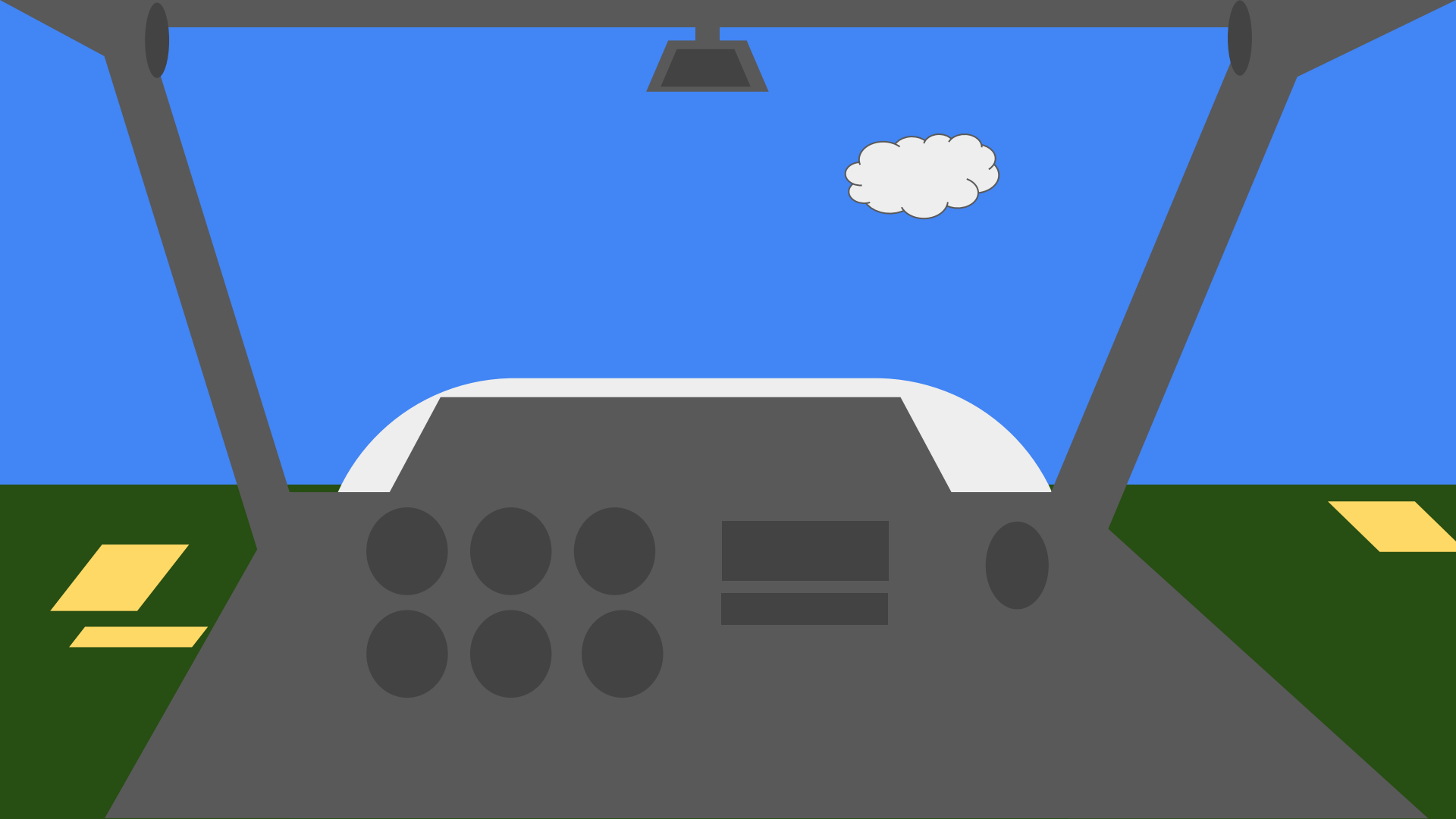


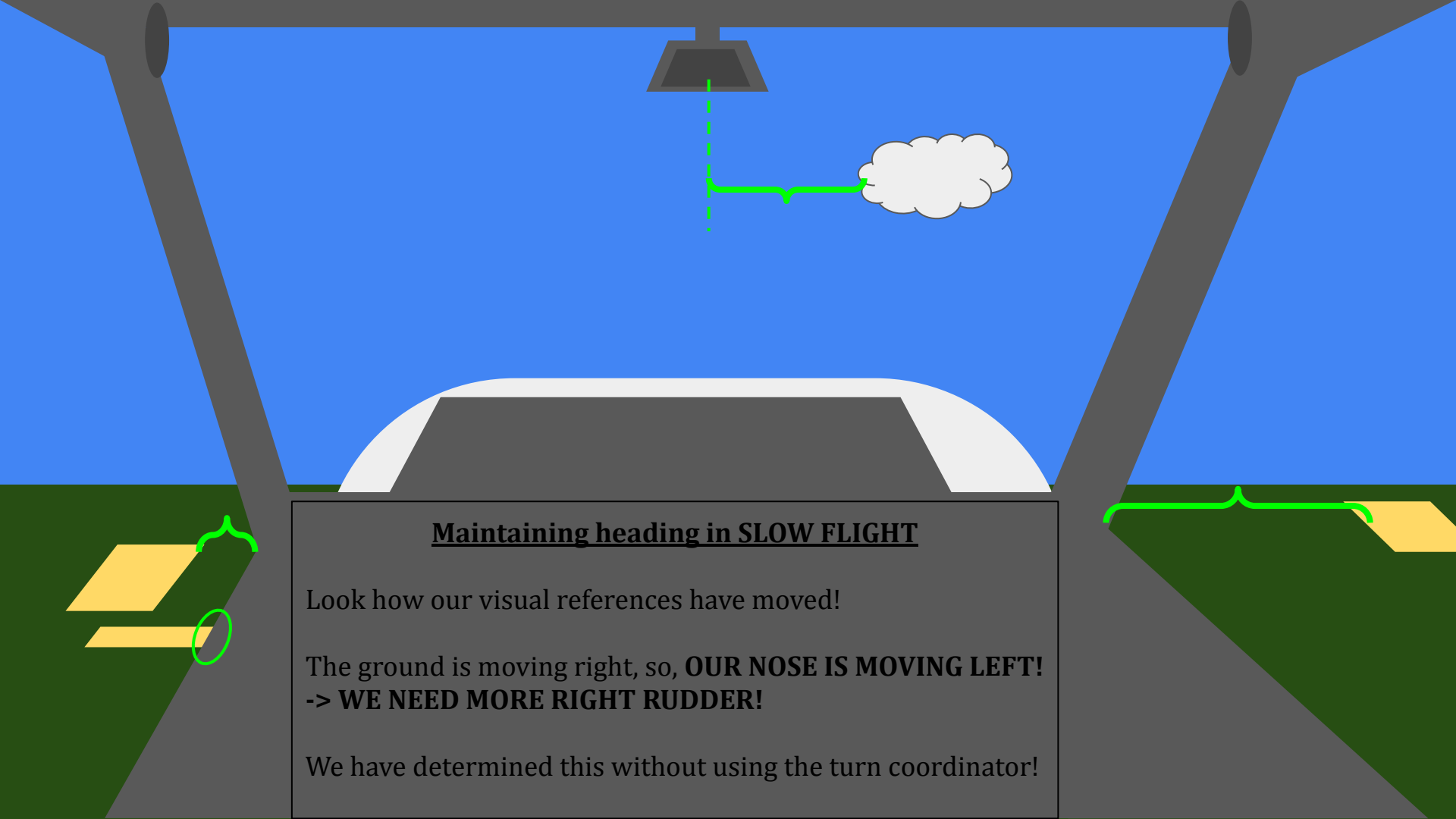
Maintaining heading in SLOW FLIGHT

Side windows & peripheral are the *MOST* Helpful!

Notice how these houses move if we drift off heading. . .
(continue going through slides)





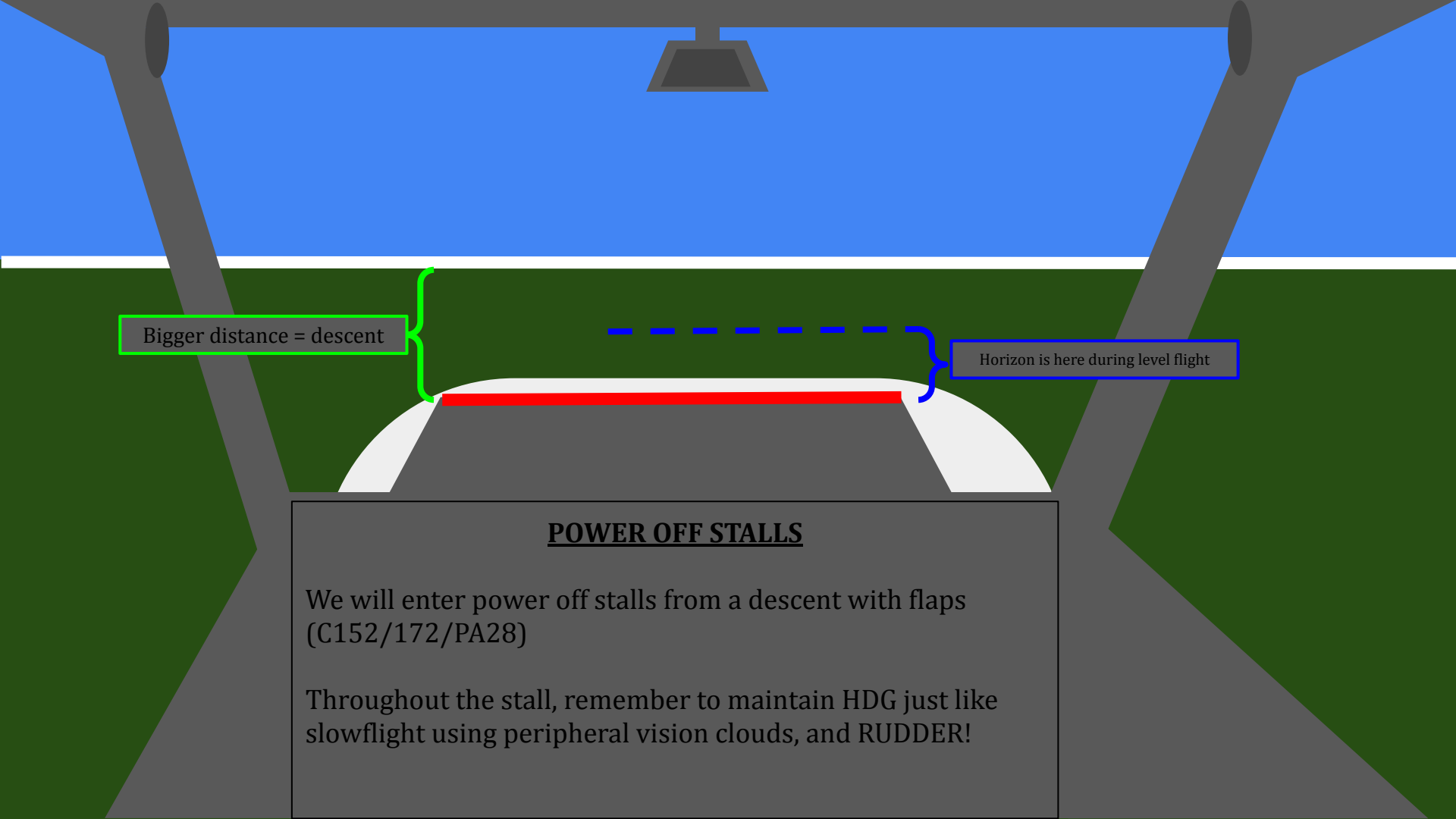


Maintaining heading in SLOW FLIGHT

Look how our visual references have moved!

The ground is moving right, so, **OUR NOSE IS MOVING LEFT!**
-> WE NEED MORE RIGHT RUDDER!

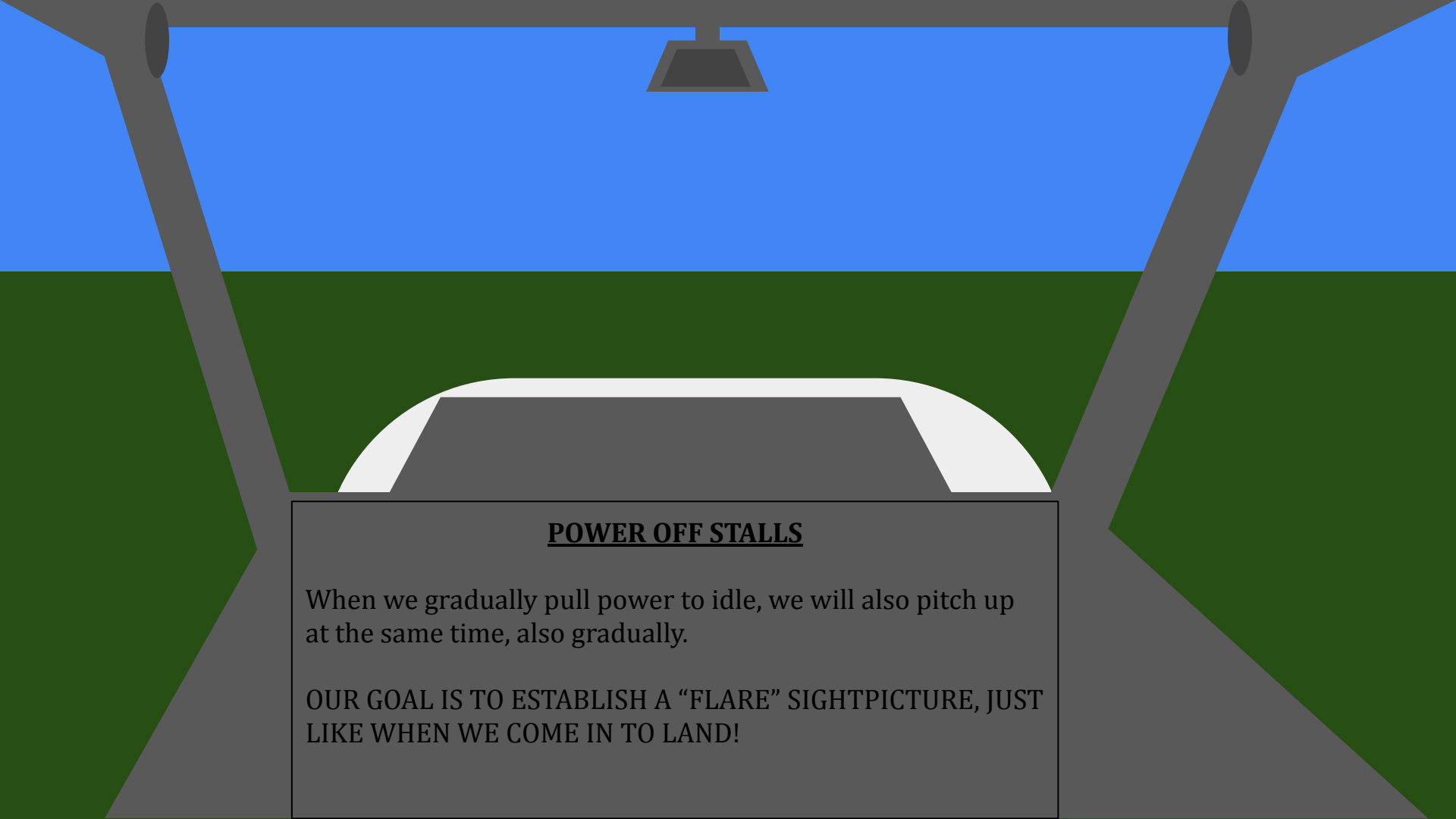
We have determined this without using the turn coordinator!

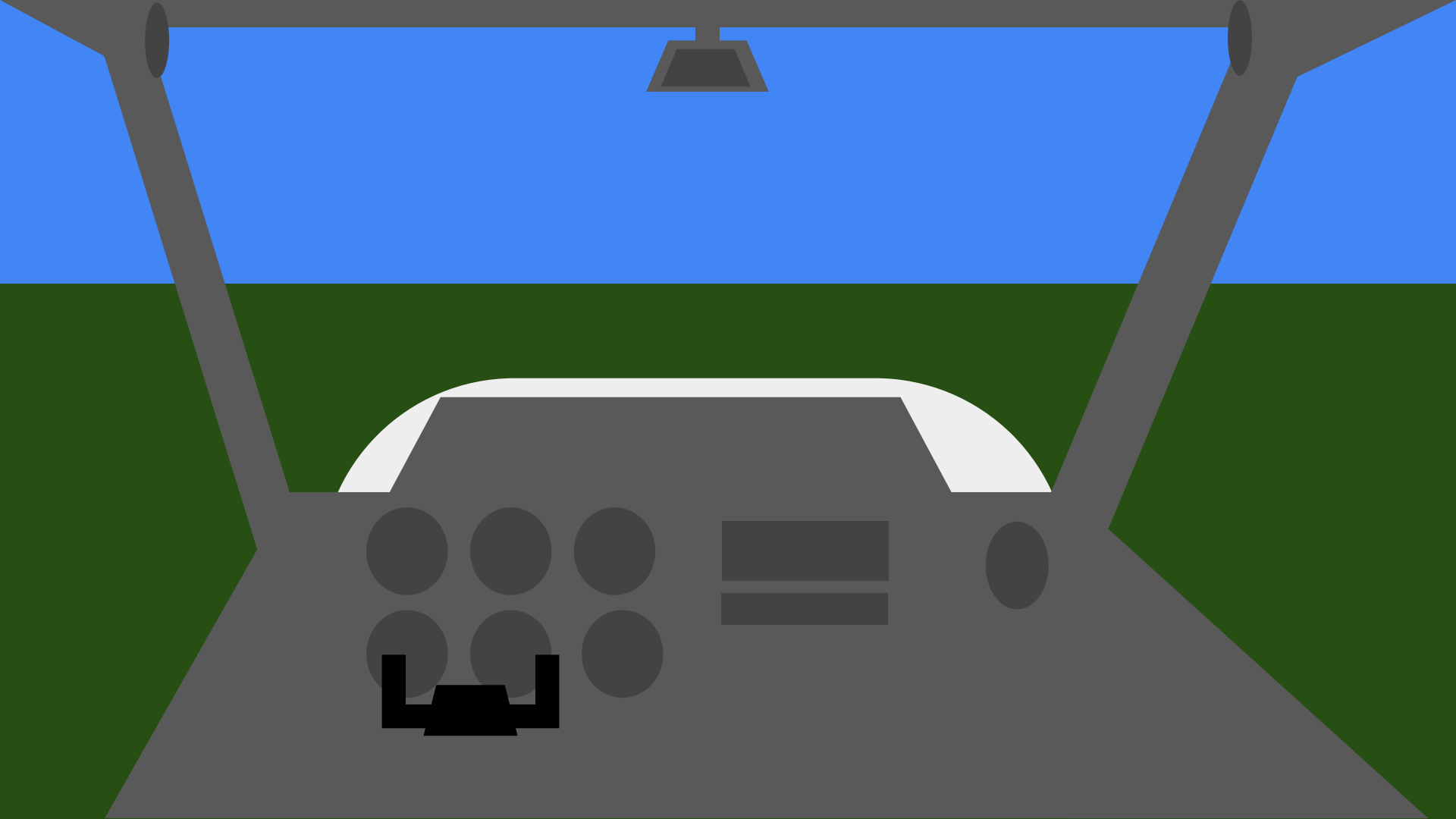


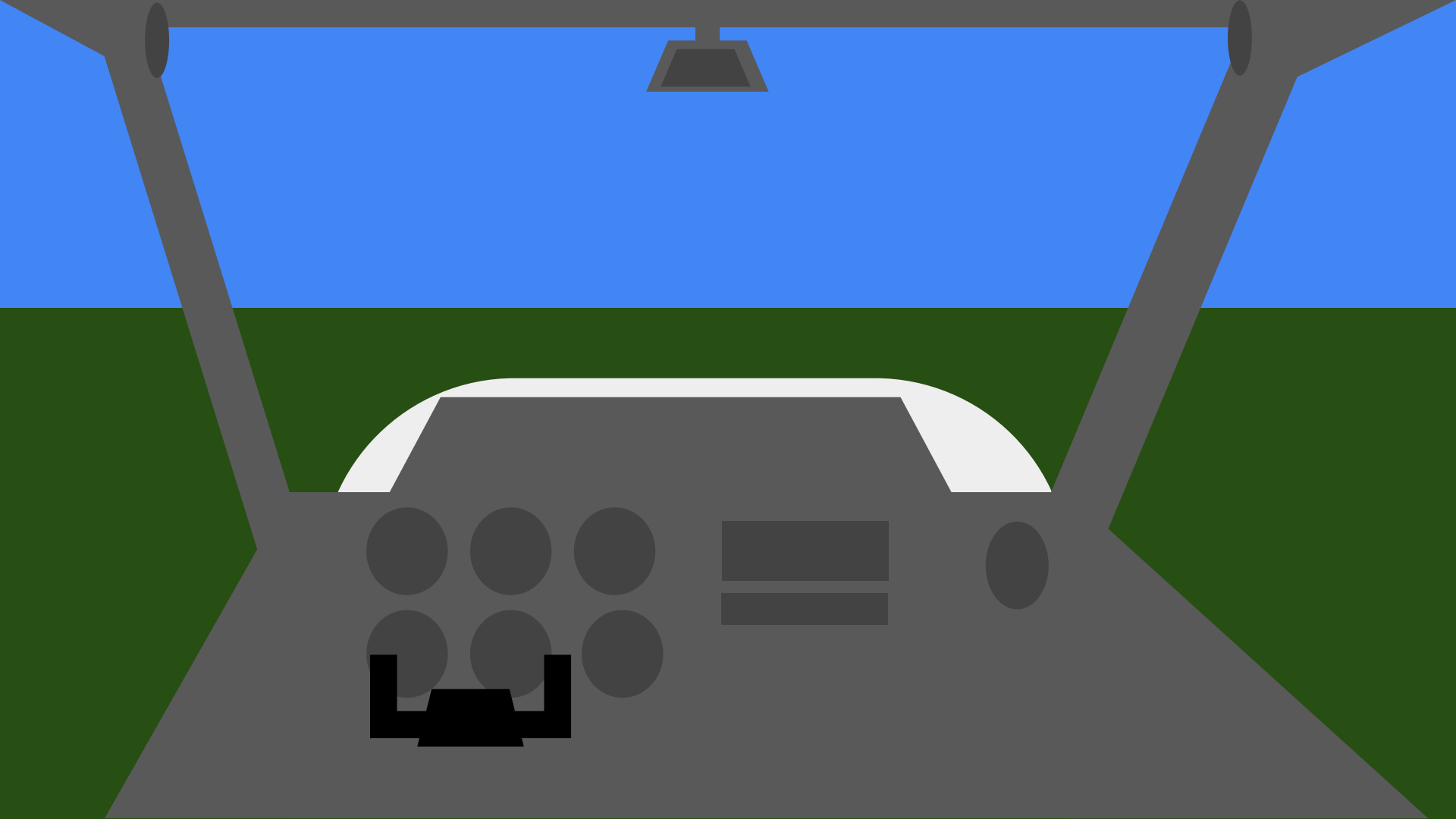
POWER OFF STALLS

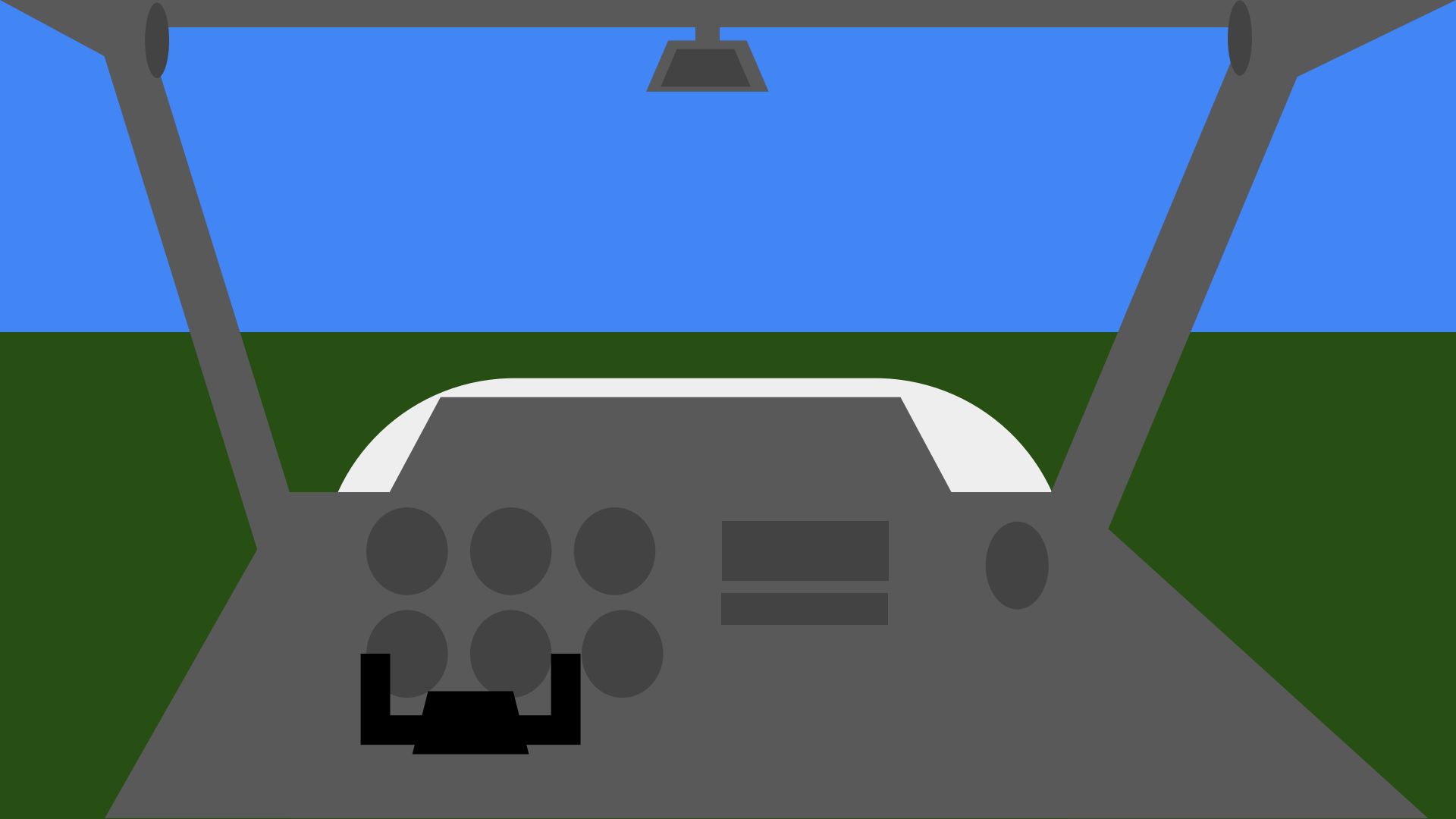
We will enter power off stalls from a descent with flaps (C152/172/PA28)

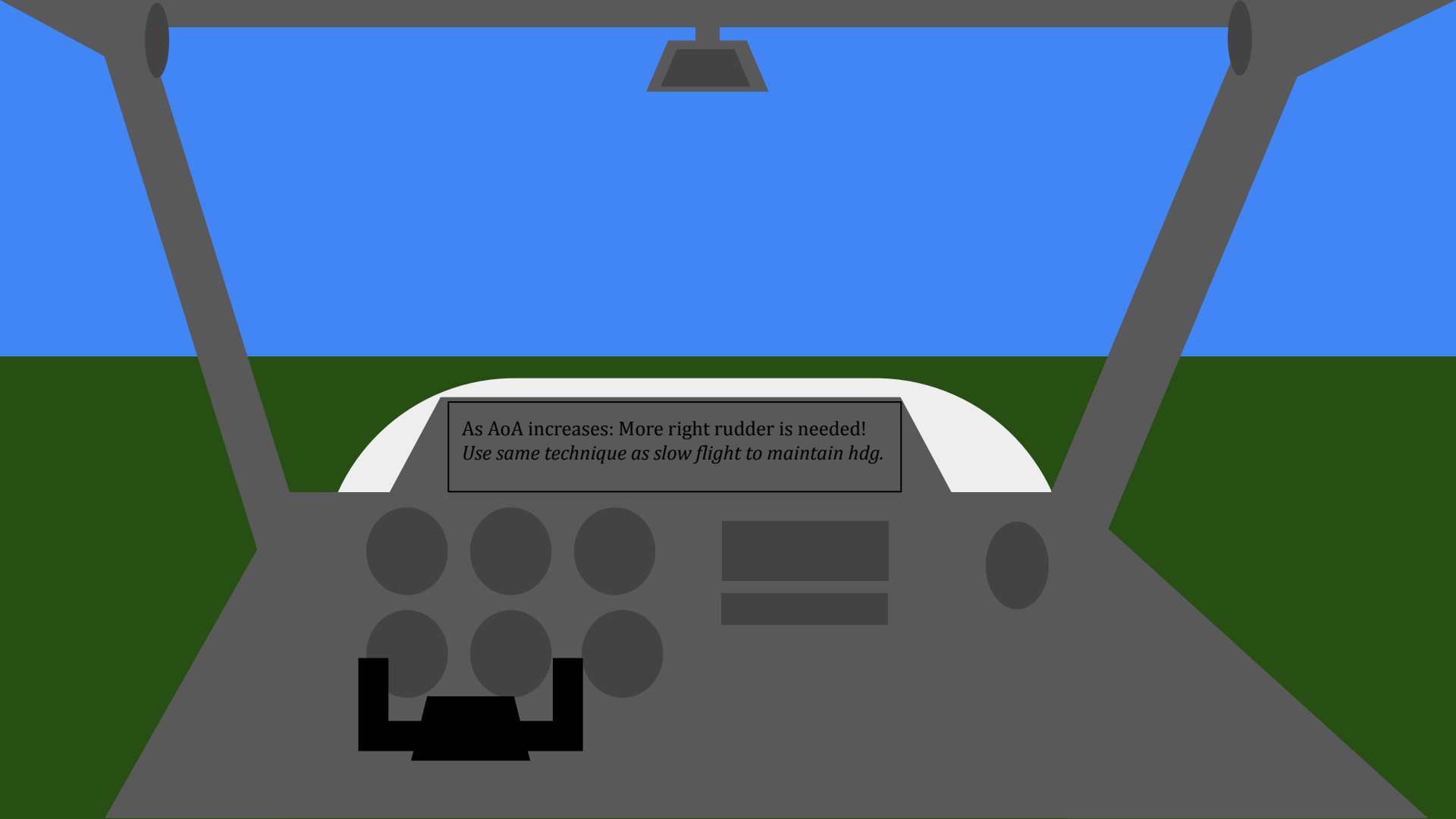
Throughout the stall, remember to maintain HDG just like slowflight using peripheral vision clouds, and RUDDER!

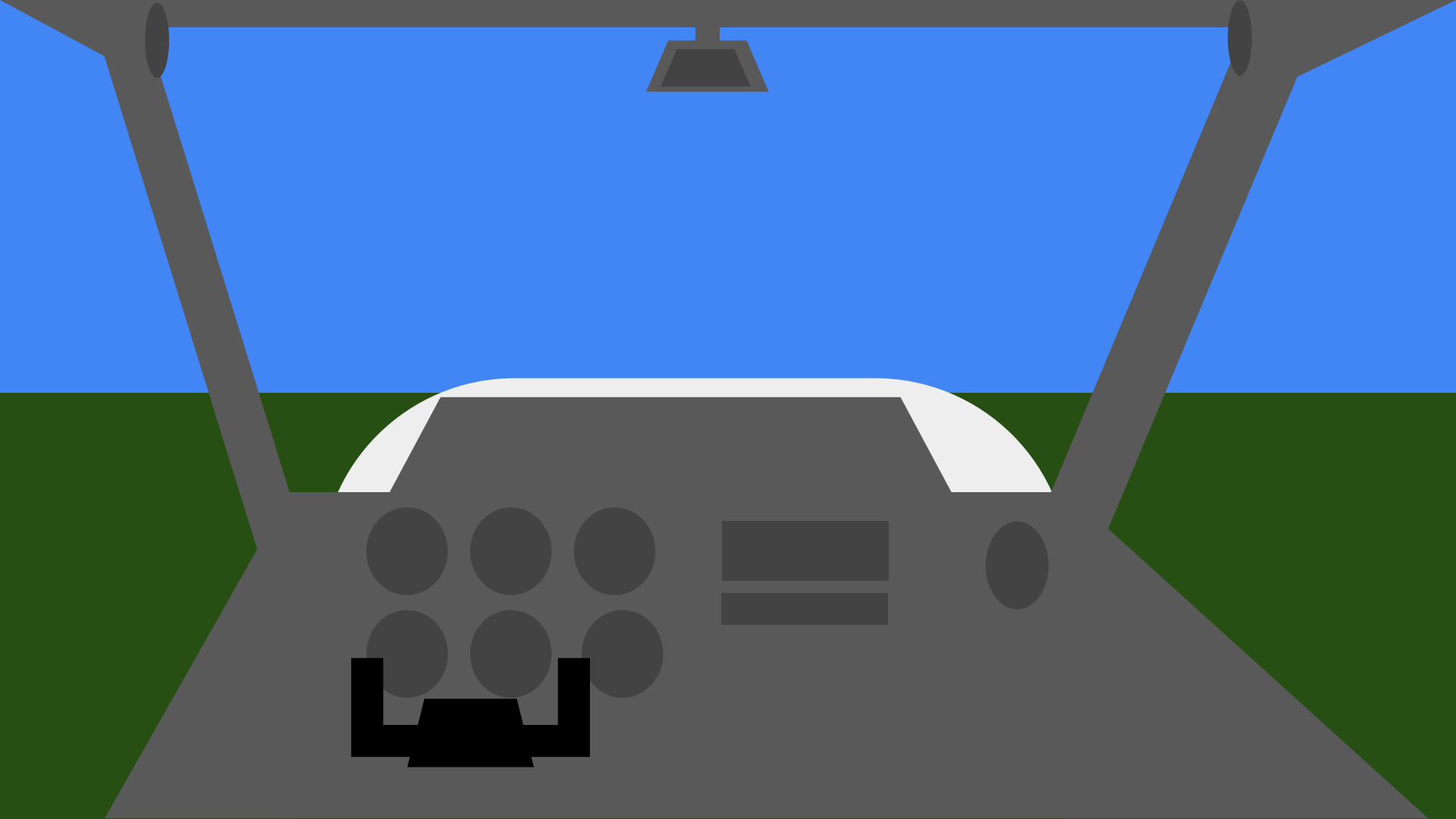

POWER OFF STALLS
When we gradually pull power to idle, we will also pitch up at the same time, also gradually.
OUR GOAL IS TO ESTABLISH A “FLARE” SIGHTPICTURE, JUST LIKE WHEN WE COME IN TO LAND!

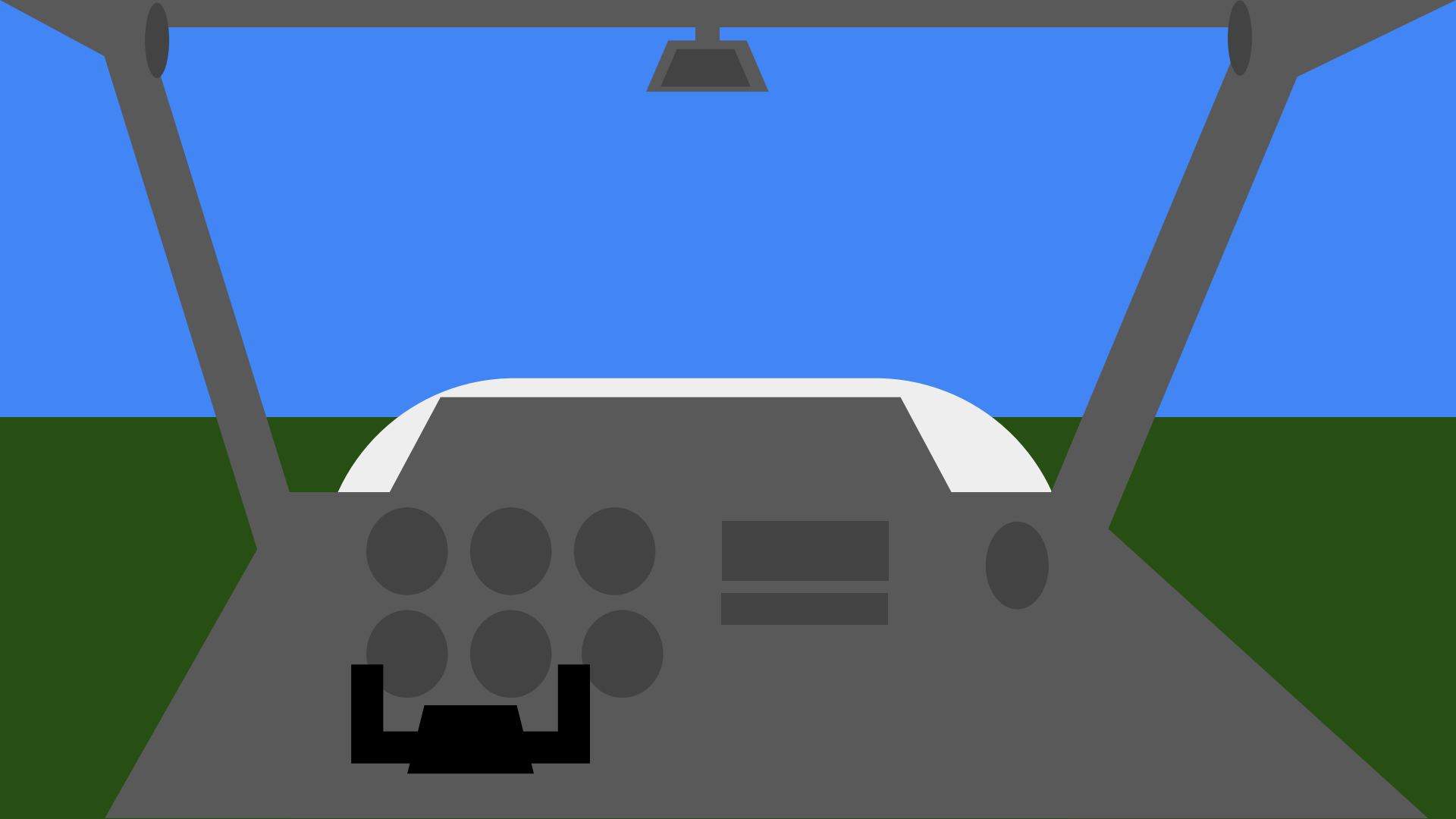


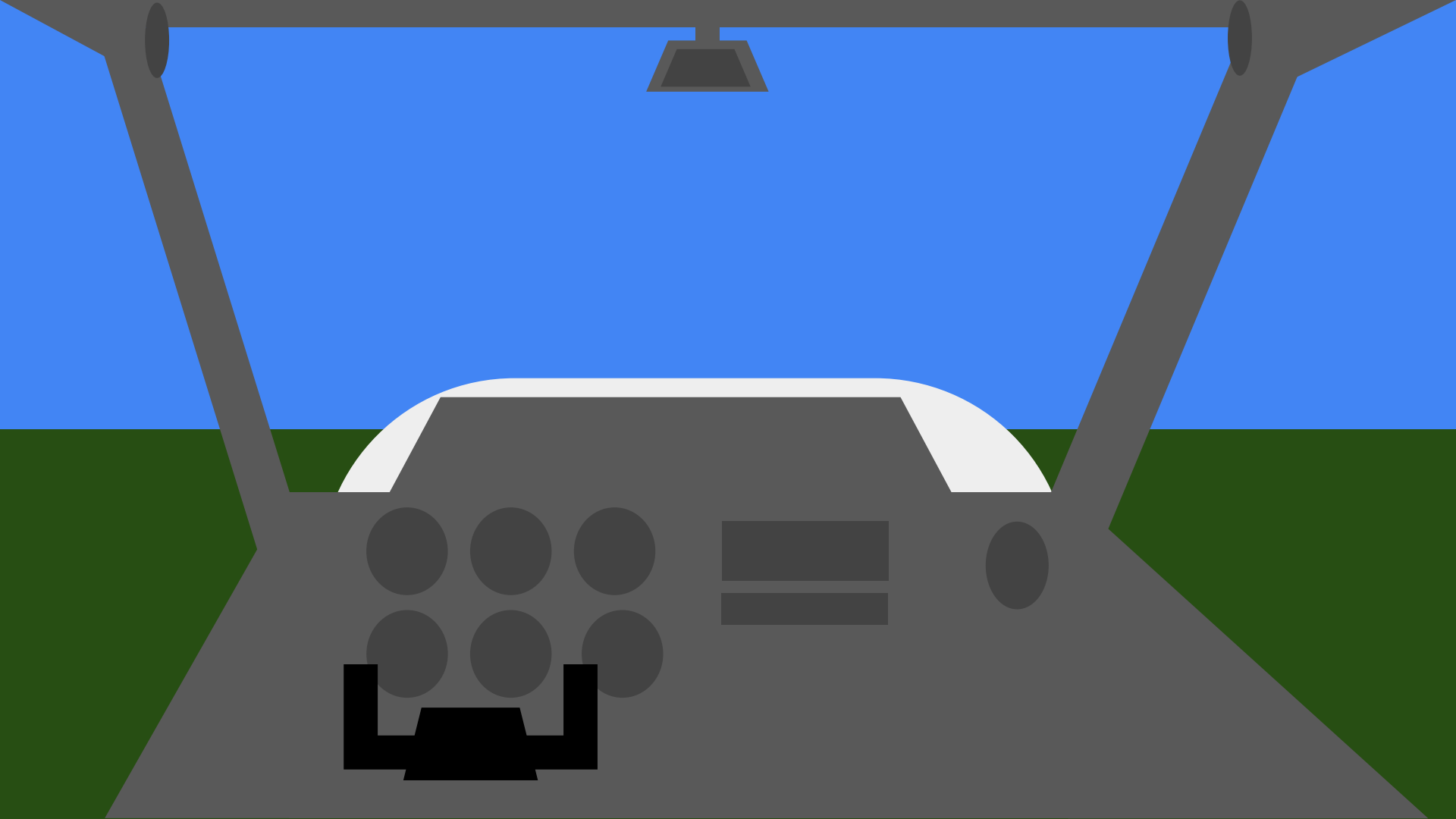


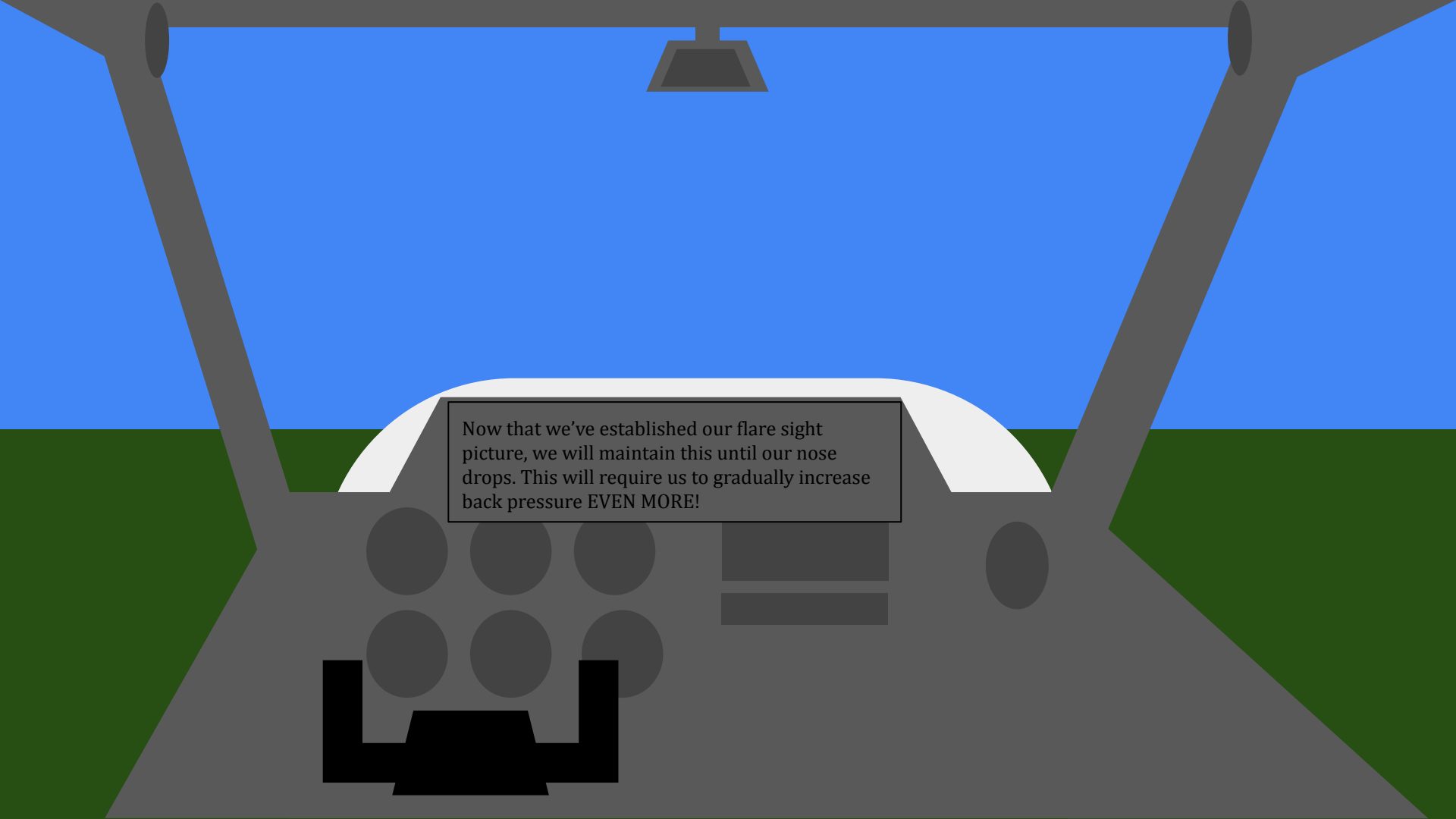


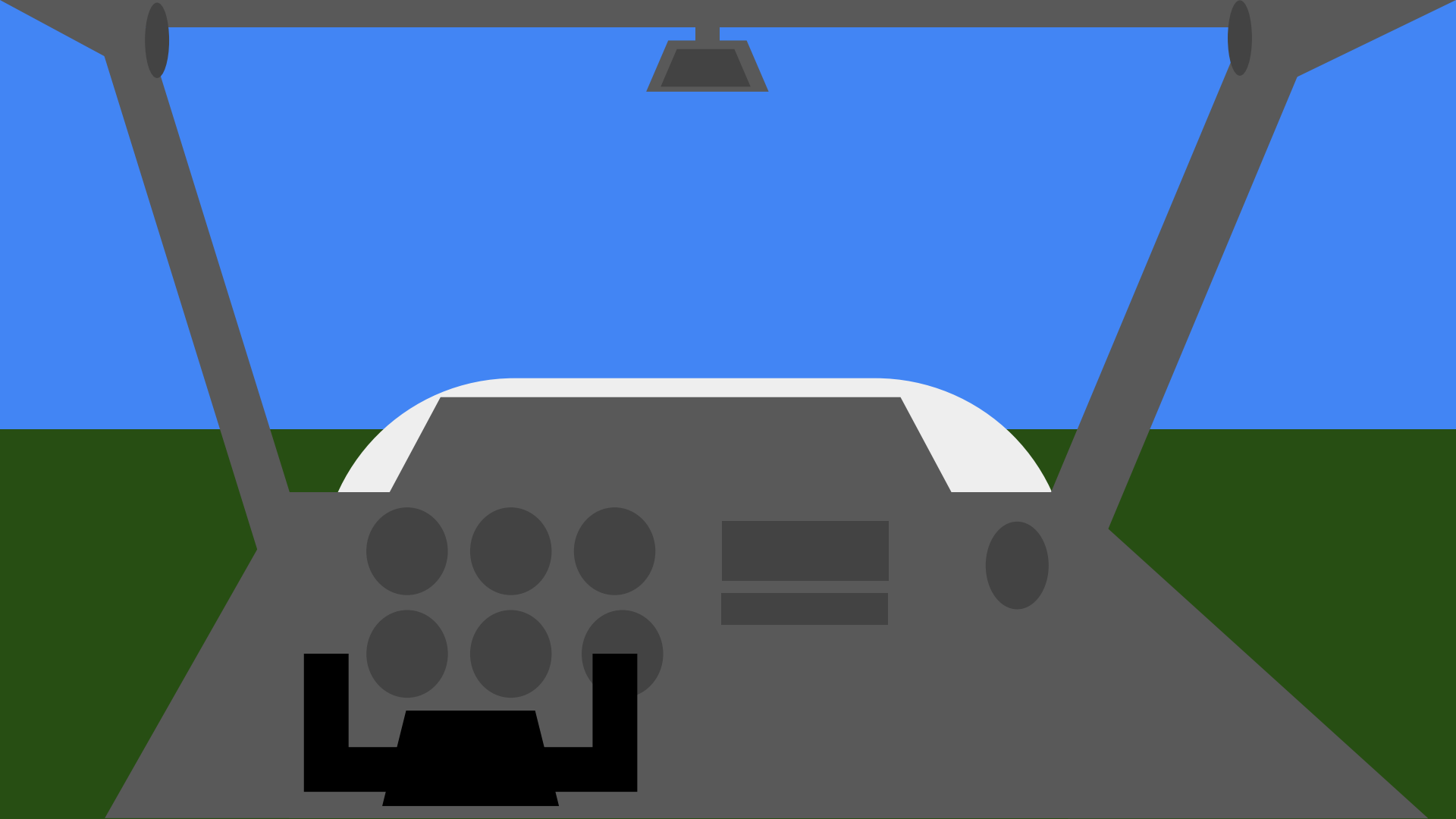

As AoA increases: More right rudder is needed!
Use same technique as slow flight to maintain hdg.

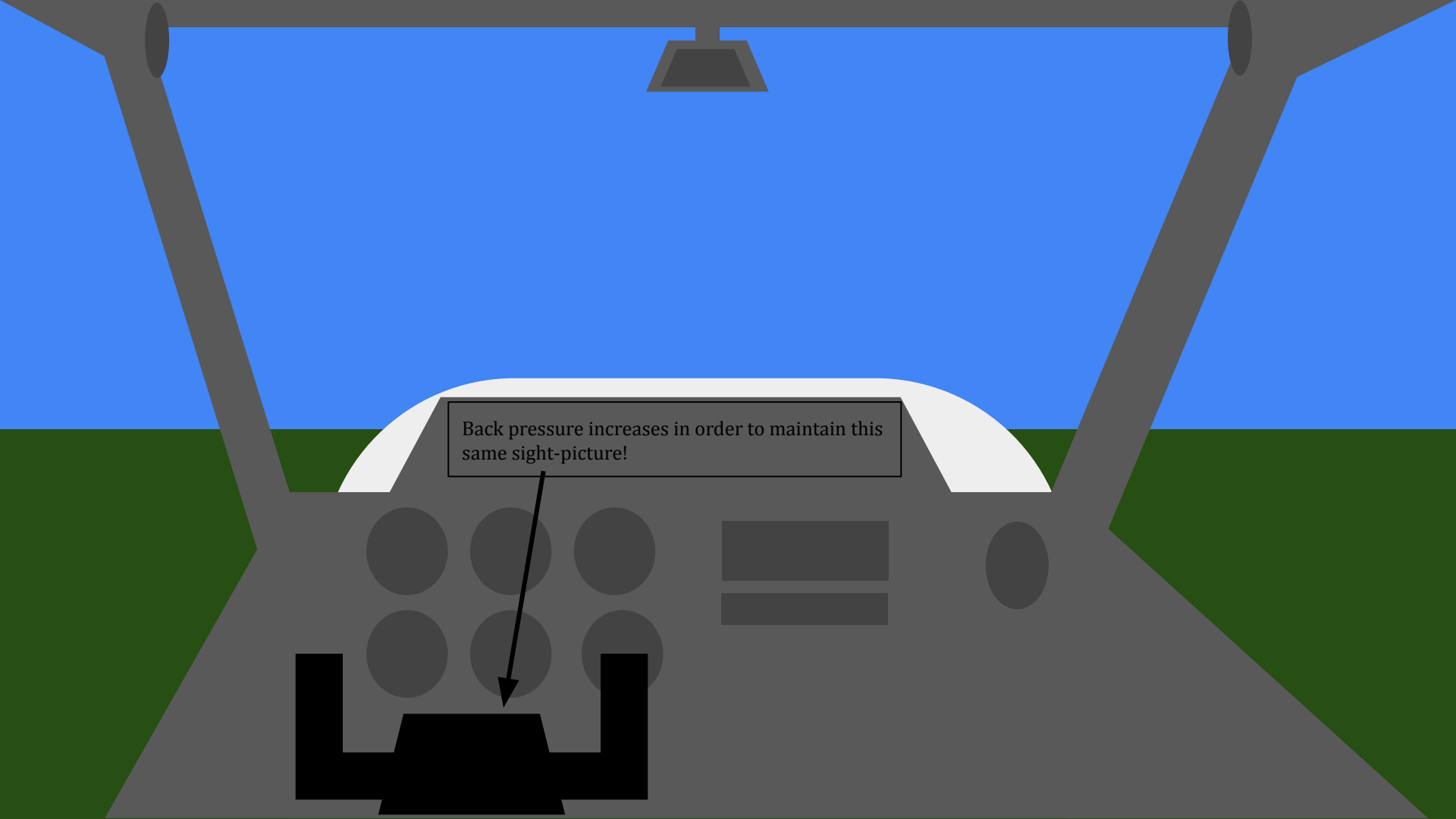


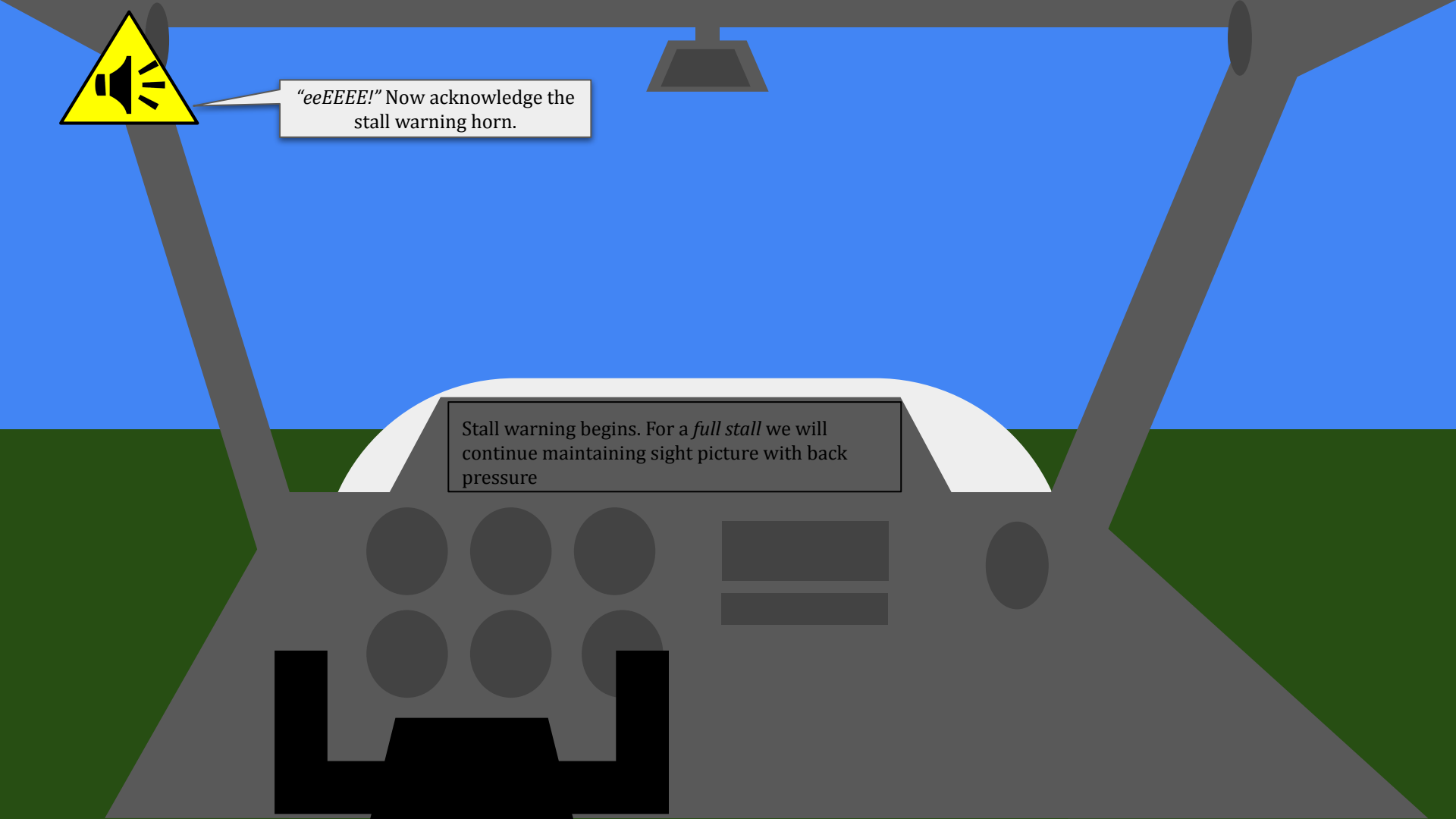


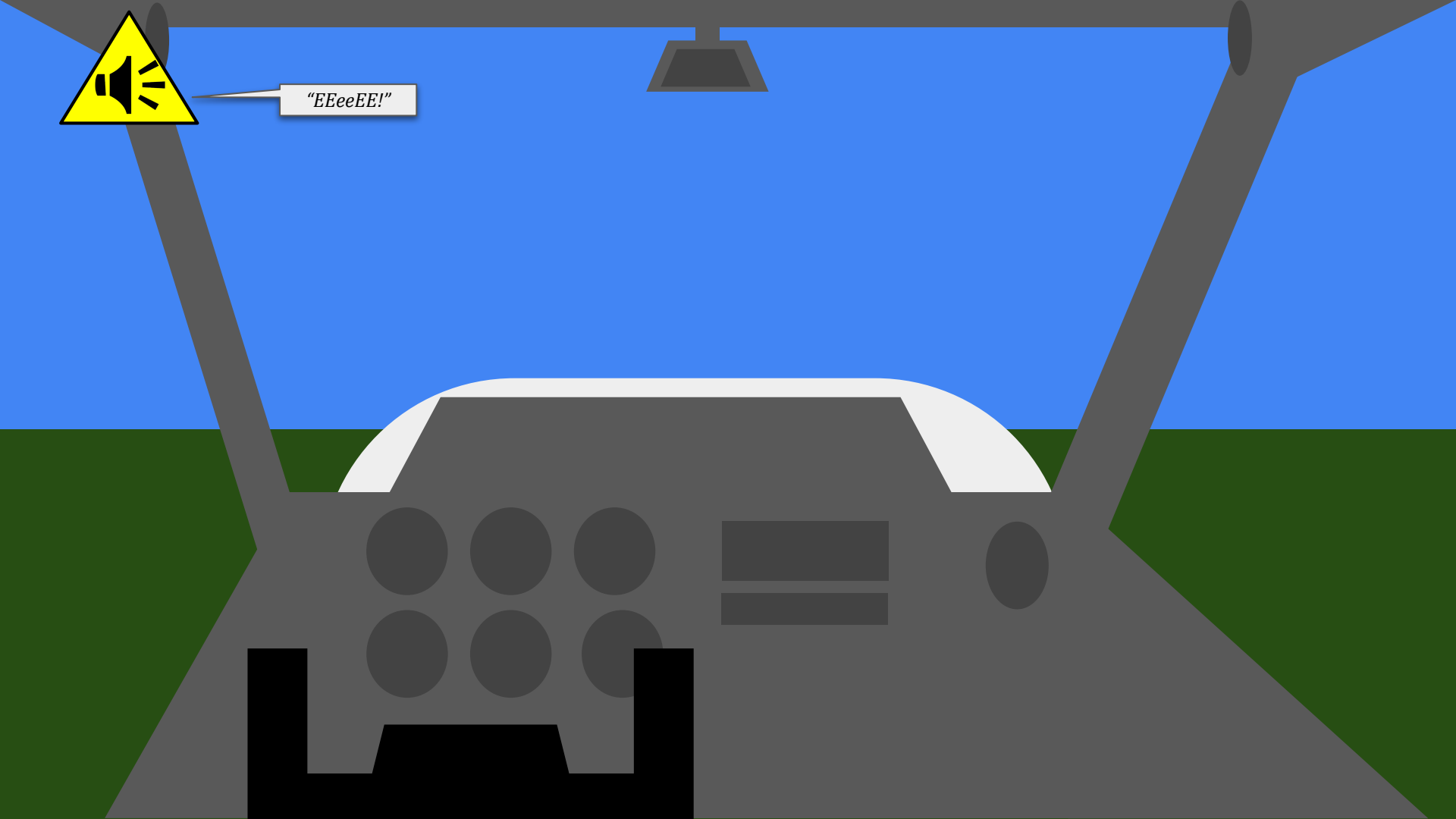


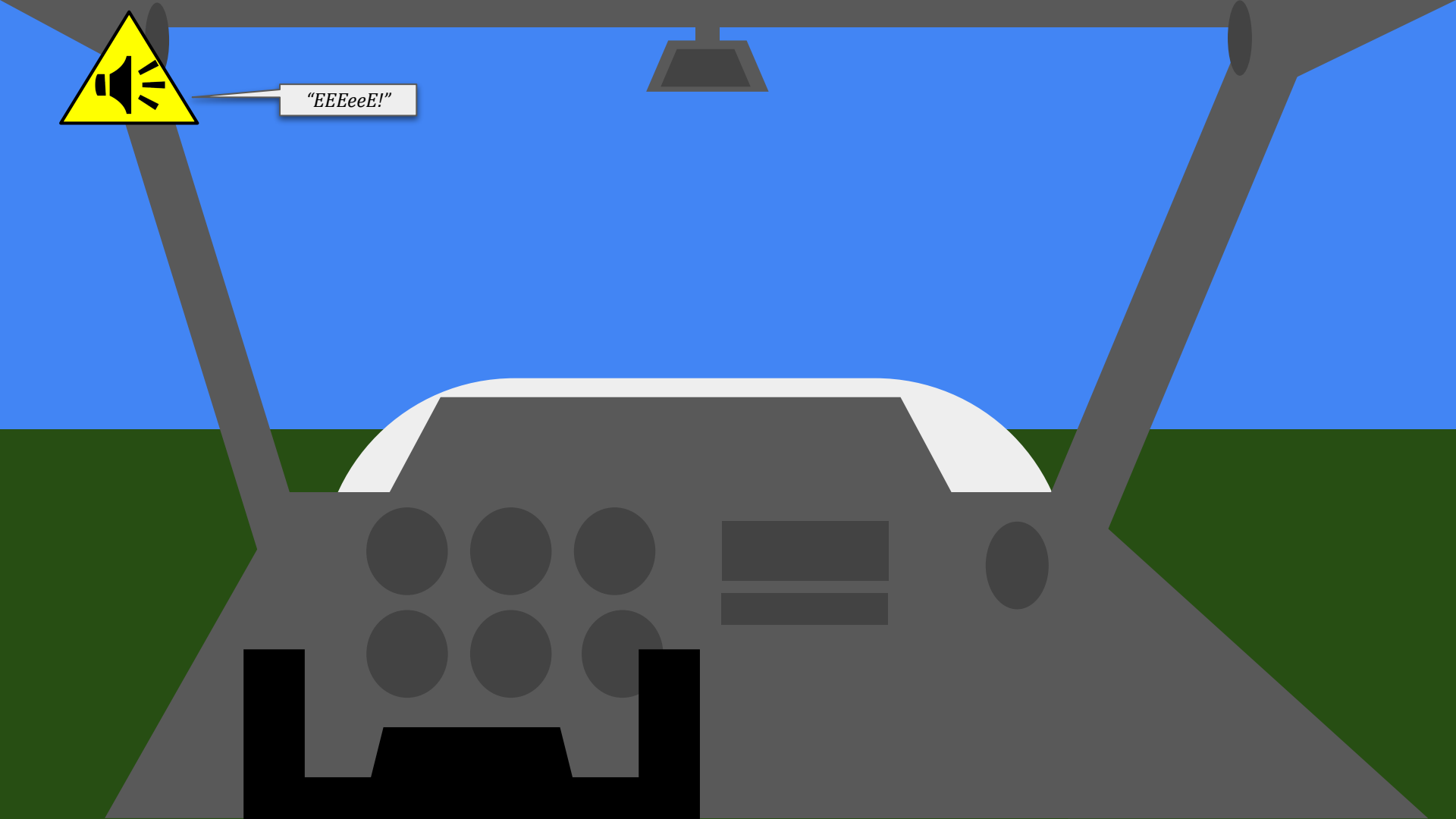

Now that we've established our flare sight picture, we will maintain this until our nose drops. This will require us to gradually increase back pressure EVEN MORE!

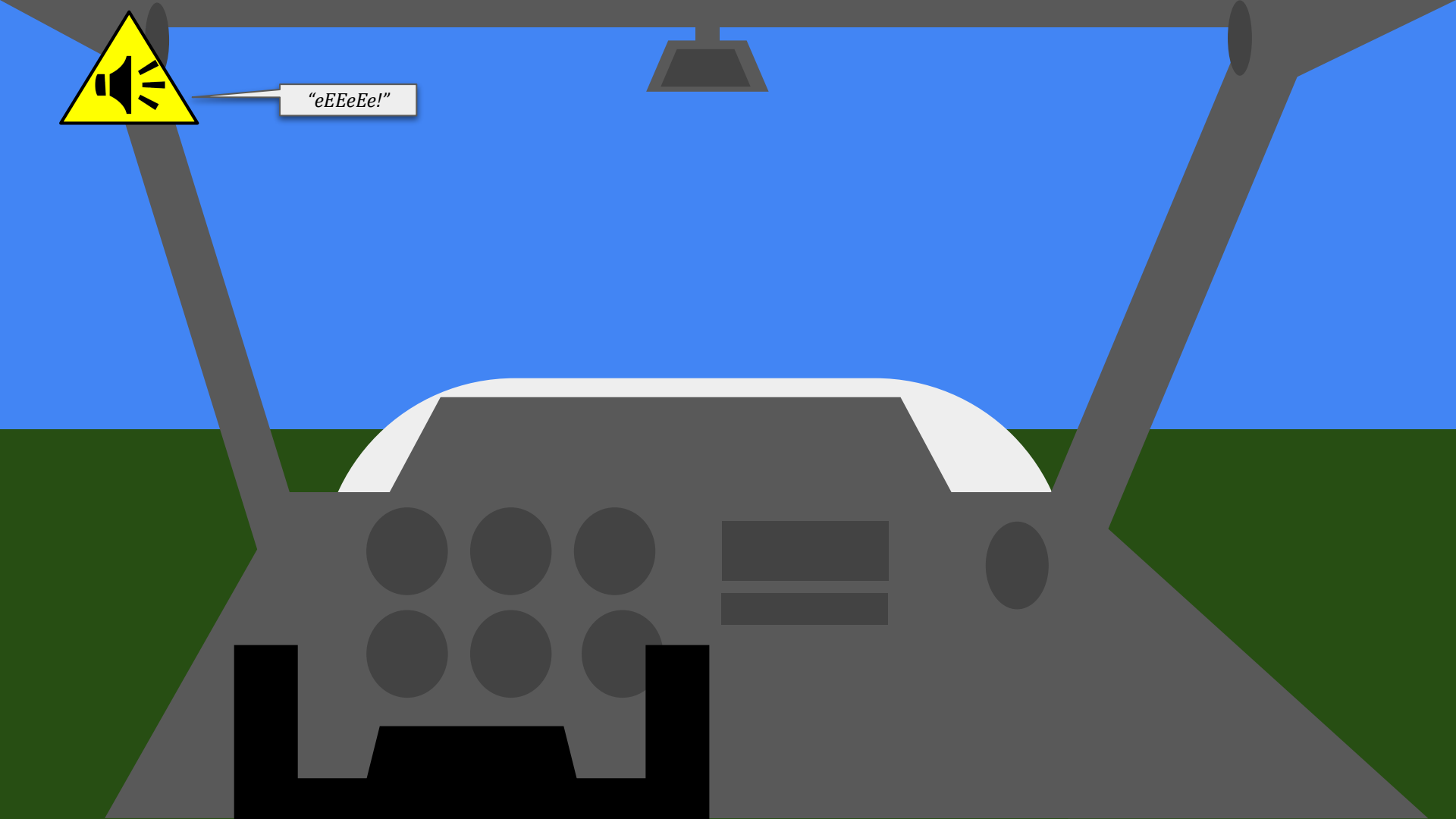


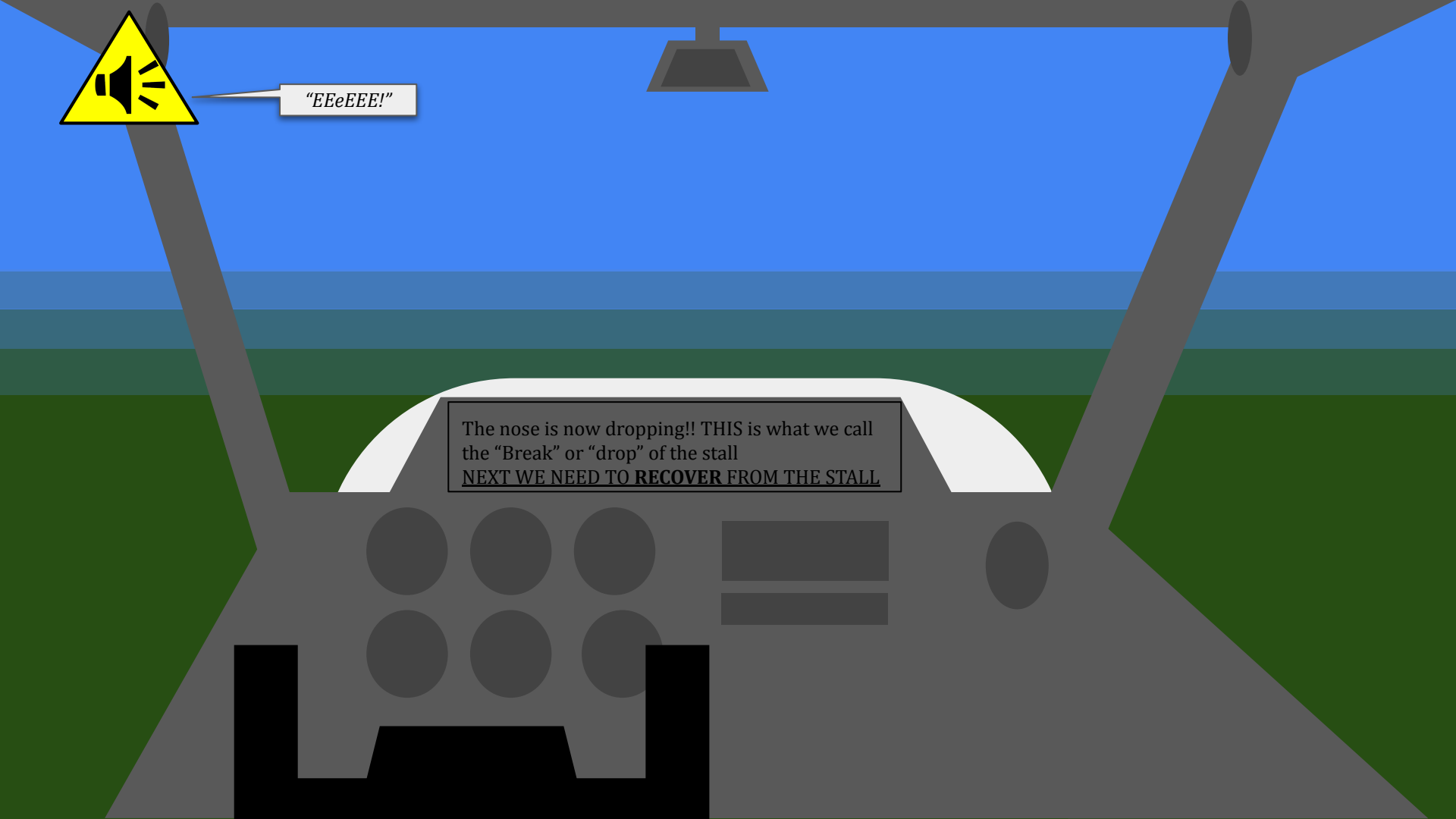

Back pressure increases in order to maintain this same sight-picture!

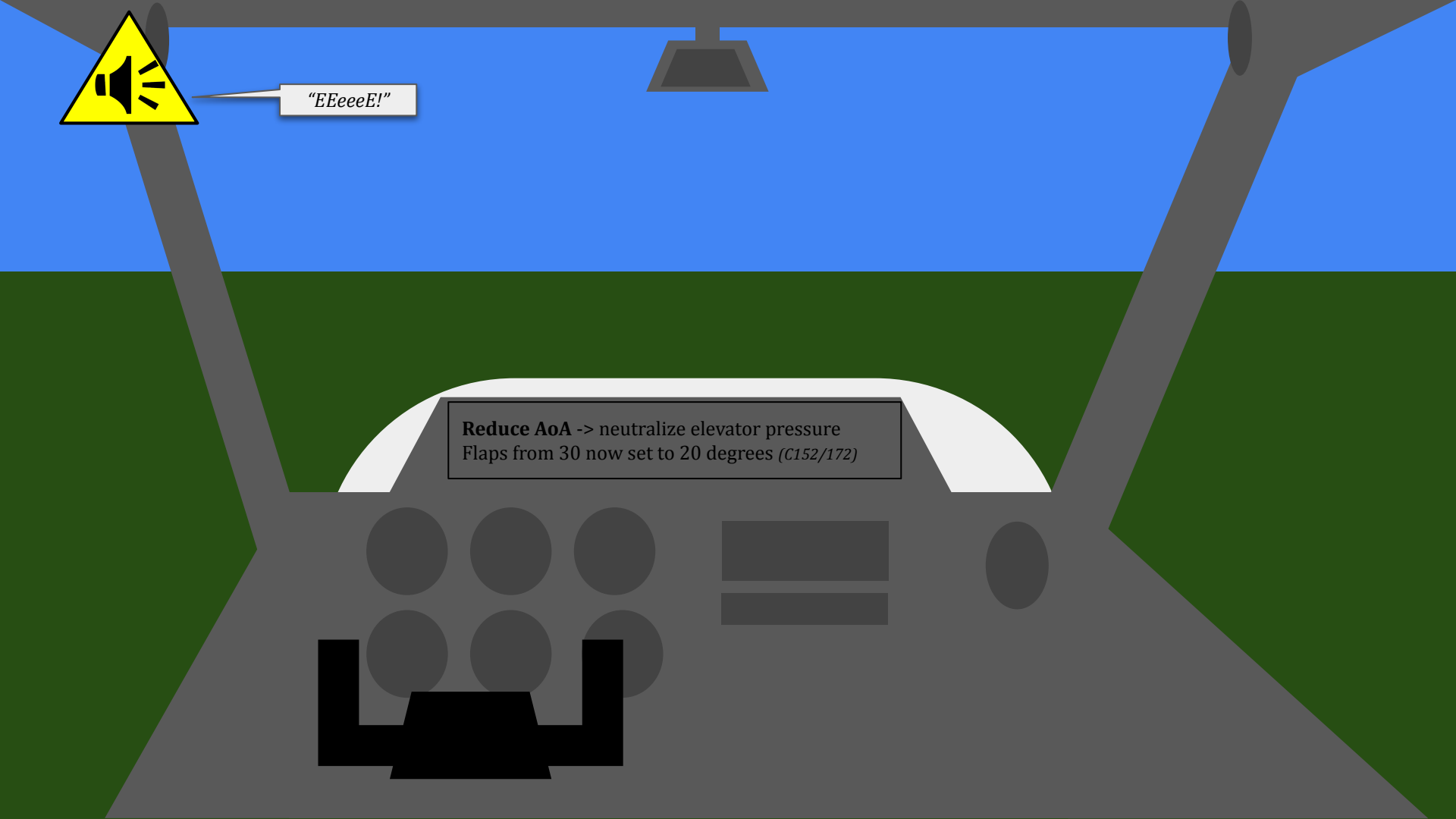

"eeEEEE!" Now acknowledge the stall warning horn.
Stall warning begins. For a *full stall* we will continue maintaining sight picture with back pressure

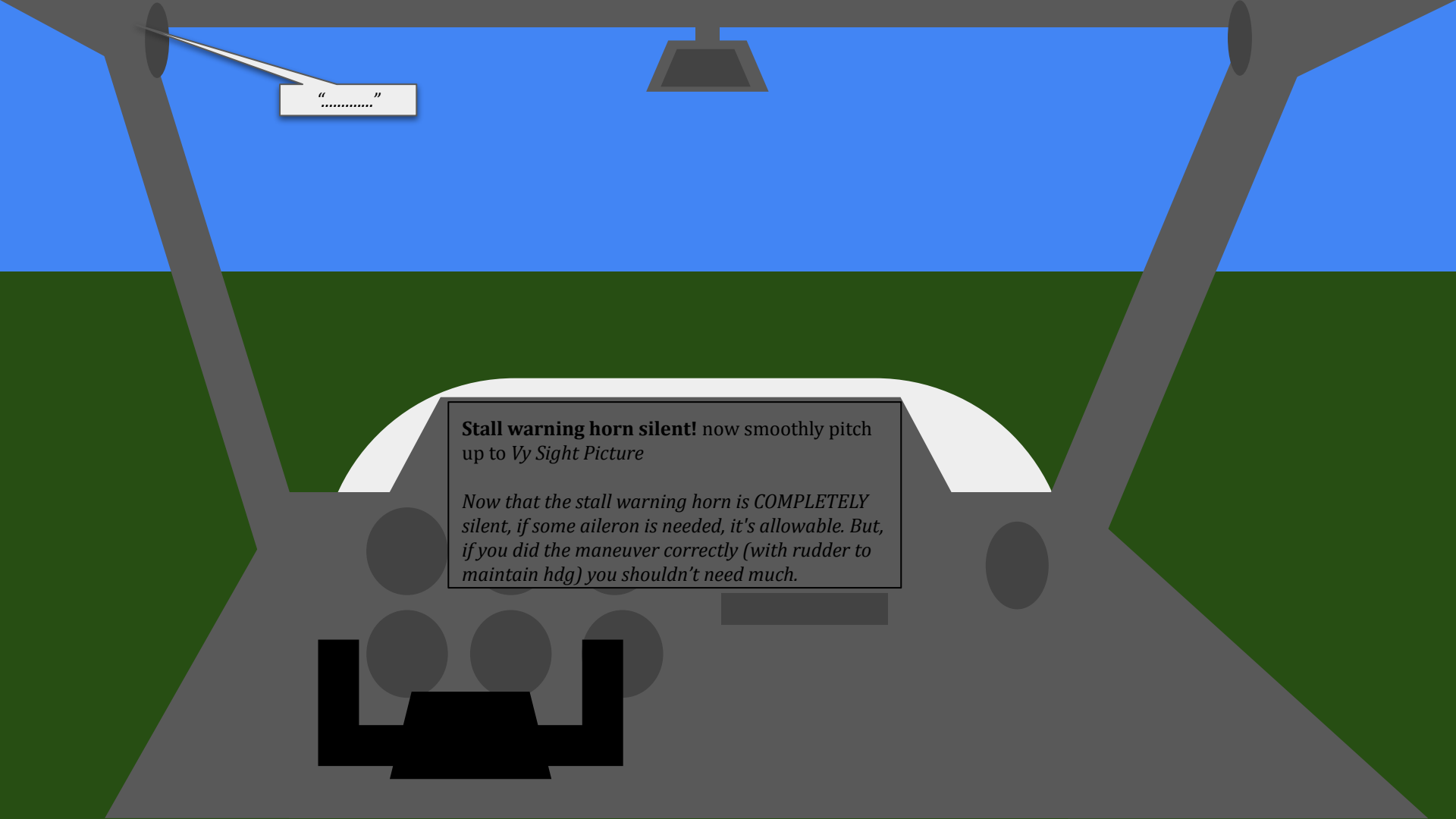

"EEeeEE!"

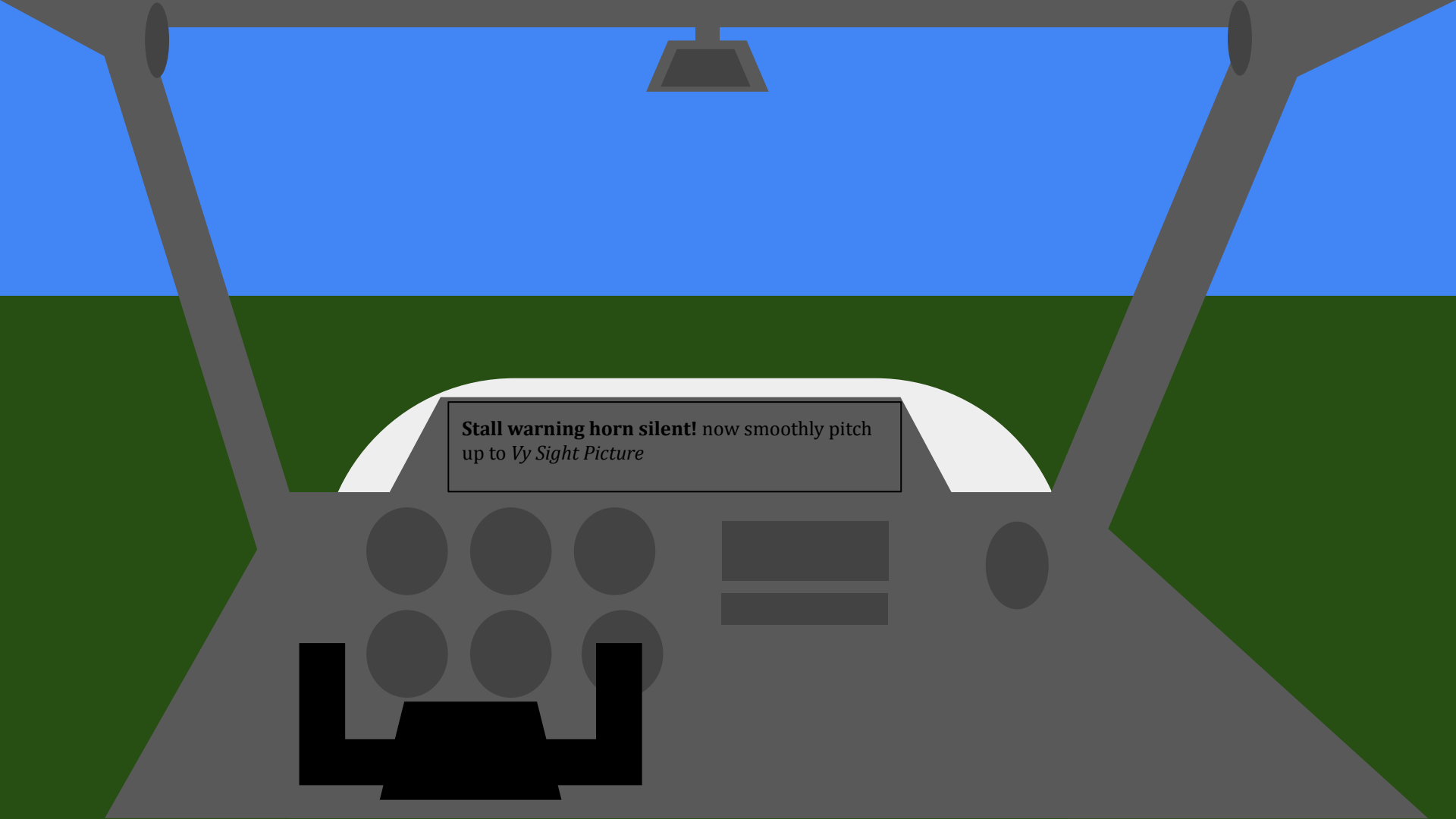

“EEEeeE!”

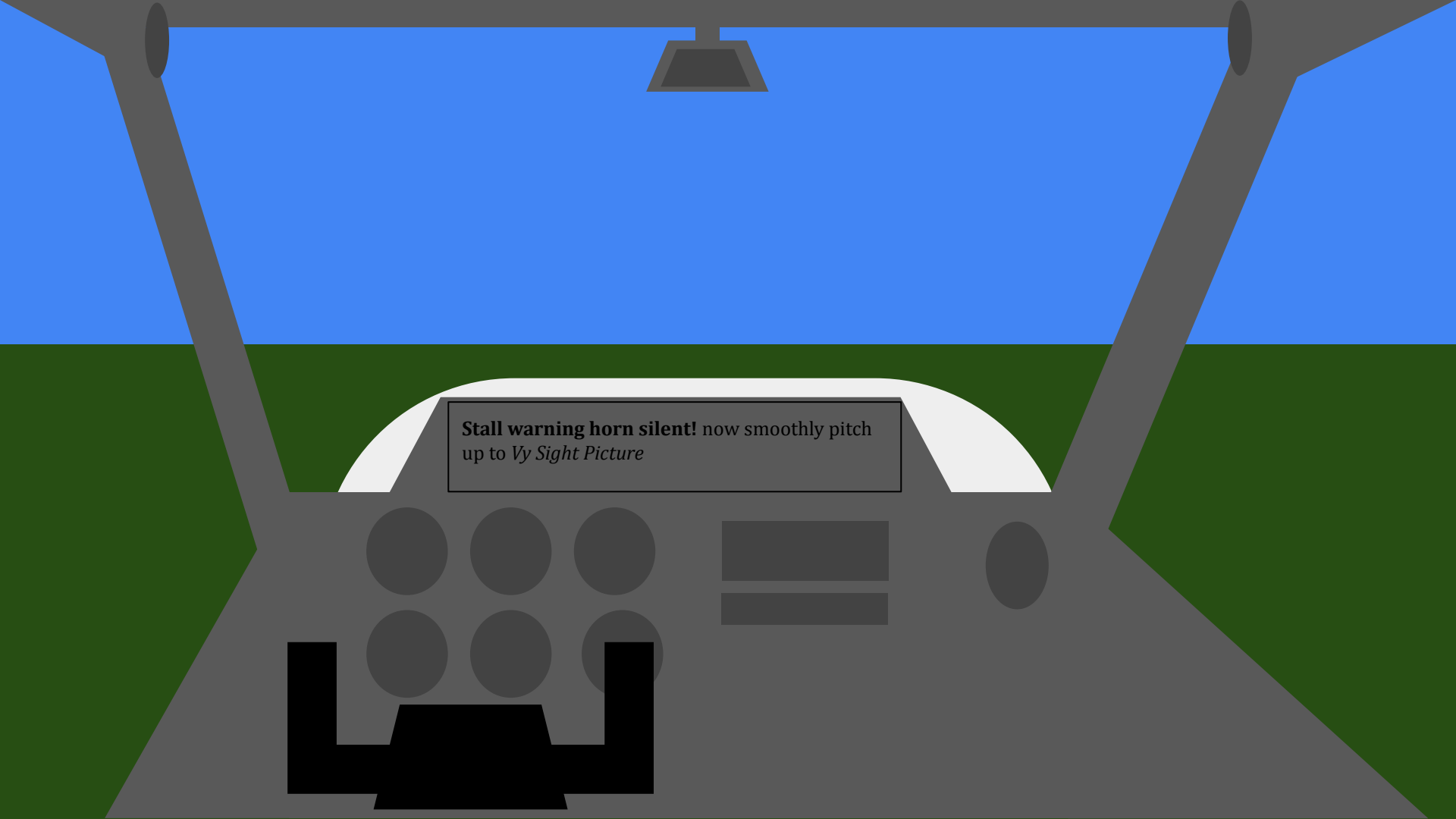

“eEEeEe!”

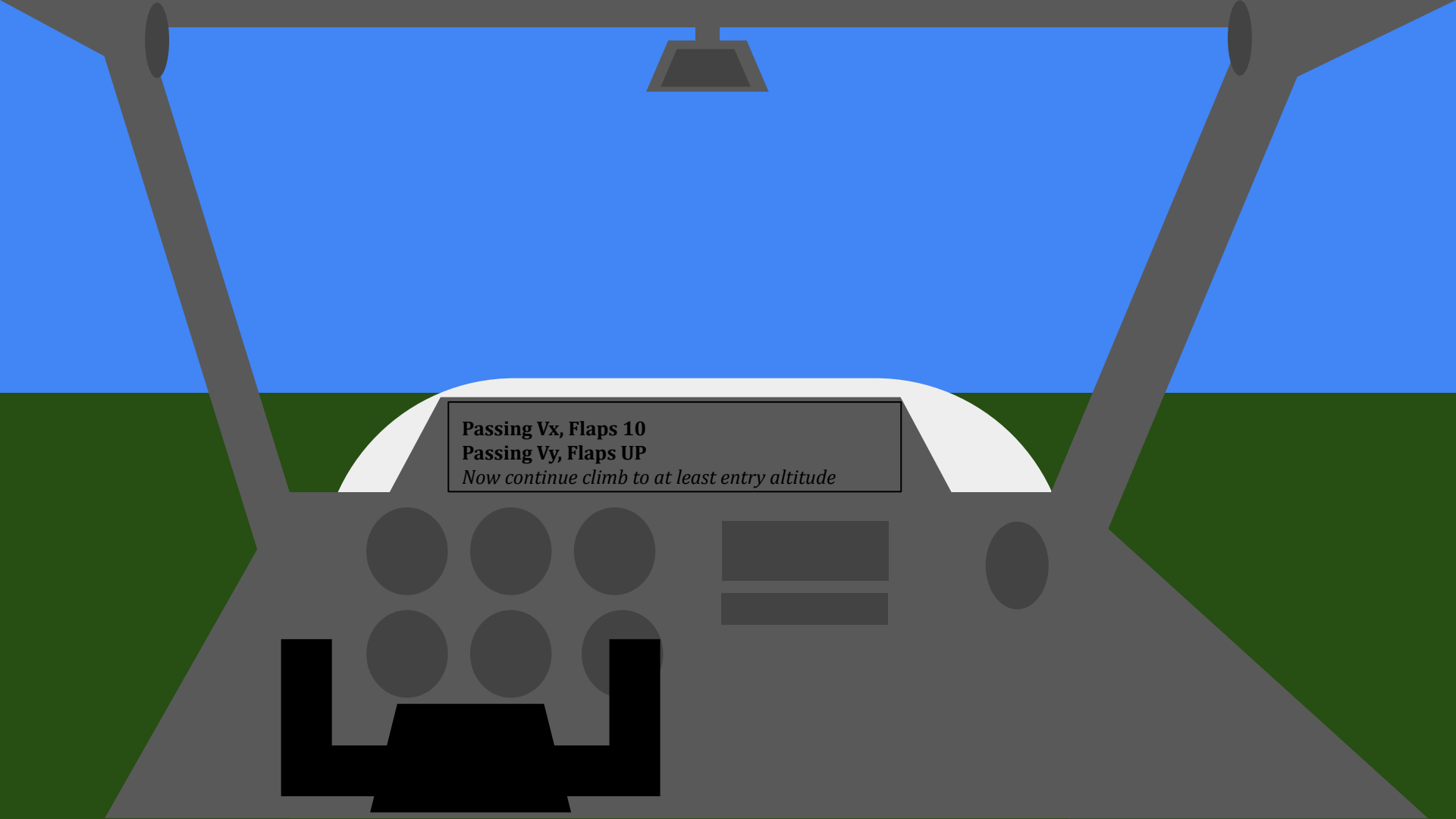

"EEeEEE!"
The nose is now dropping!! THIS is what we call the "Break" or "drop" of the stall
NEXT WE NEED TO **RECOVER** FROM THE STALL

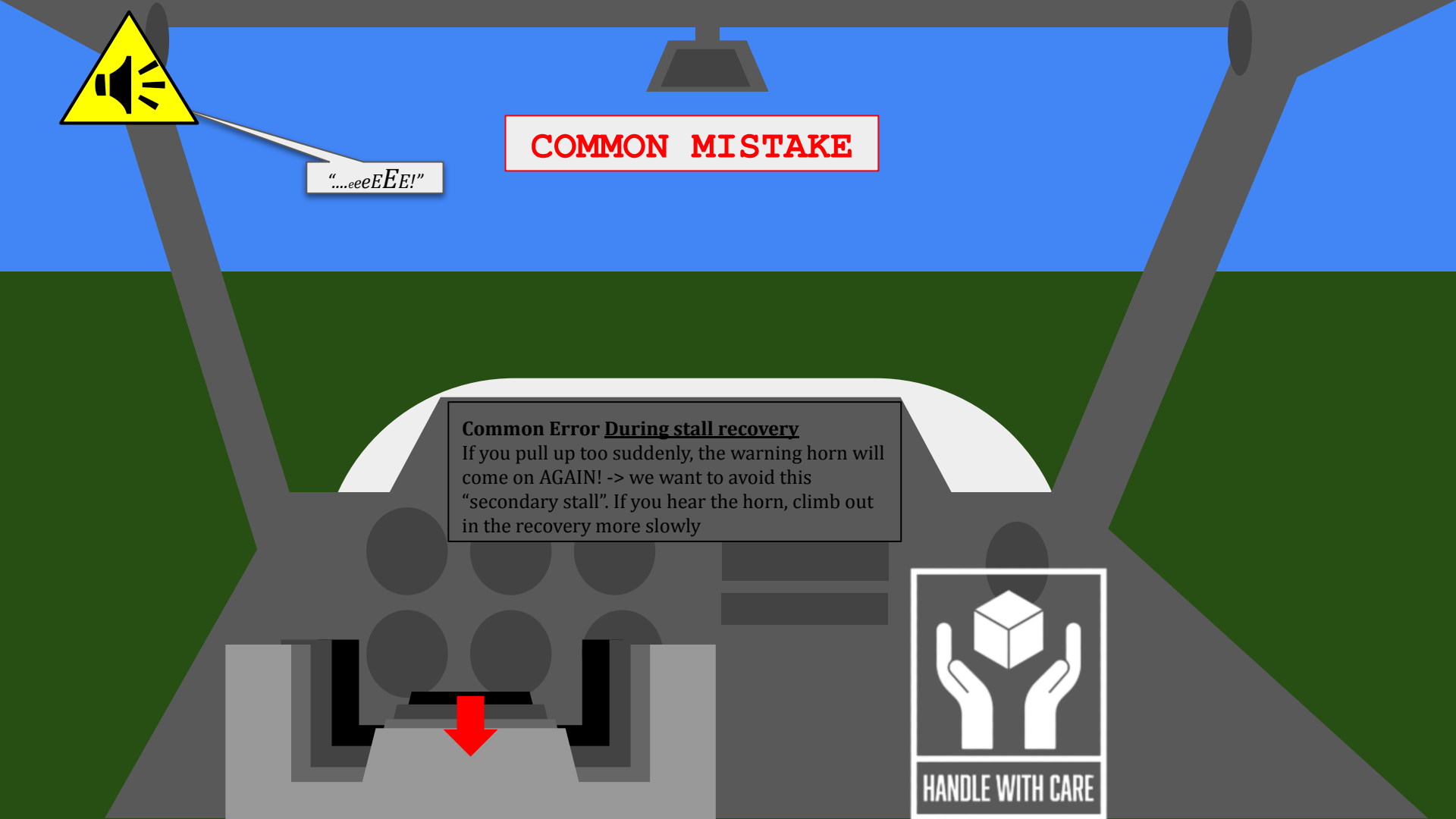

"EEeeeE!"
Reduce AoA -> neutralize elevator pressure
Flaps from 30 now set to 20 degrees *(C152/172)*

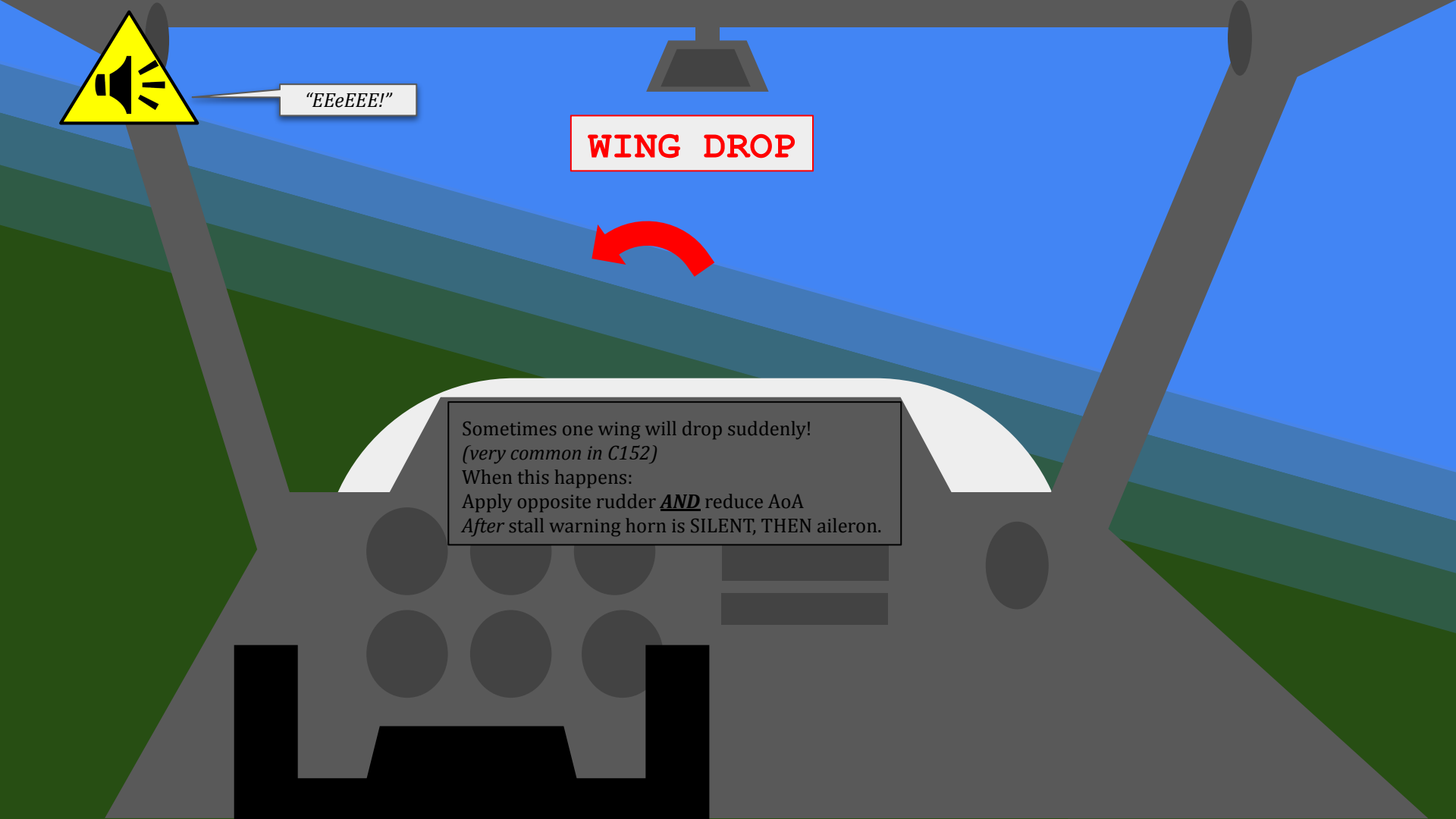

“ ”
Stall warning horn silent! now smoothly pitch up to *Vy Sight Picture*
Now that the stall warning horn is COMPLETELY silent, if some aileron is needed, it's allowable. But, if you did the maneuver correctly (with rudder to maintain hdg) you shouldn’t need much.

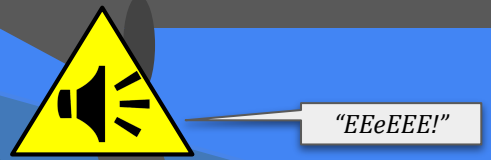

Stall warning horn silent! now smoothly pitch up to *Vy Sight Picture*


Stall warning horn silent! now smoothly pitch up to *Vy Sight Picture*


Passing Vx, Flaps 10
Passing Vy, Flaps UP
Now continue climb to at least entry altitude


"....eeeEEE!"
COMMON MISTAKE
Common Error During stall recovery
If you pull up too suddenly, the warning horn will come on AGAIN! -> we want to avoid this "secondary stall". If you hear the horn, climb out in the recovery more slowly
HANDLE WITH CARE


"EEeEEE!"
WING DROP
Sometimes one wing will drop suddenly!
(very common in C152)
When this happens:
Apply opposite rudder ***AND*** reduce AoA
After stall warning horn is SILENT, THEN aileron.

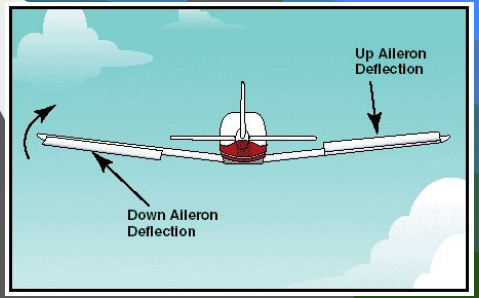


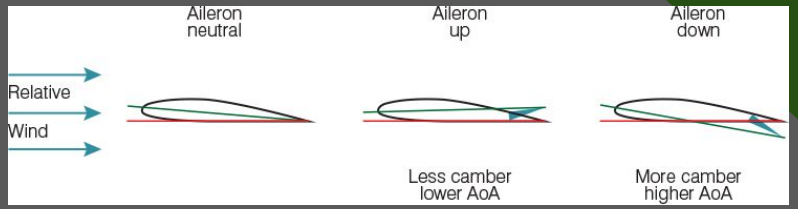
"EEeEEE!"

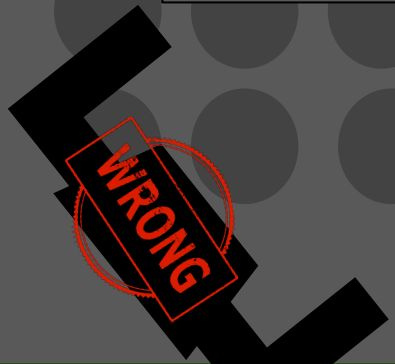
WING DROP

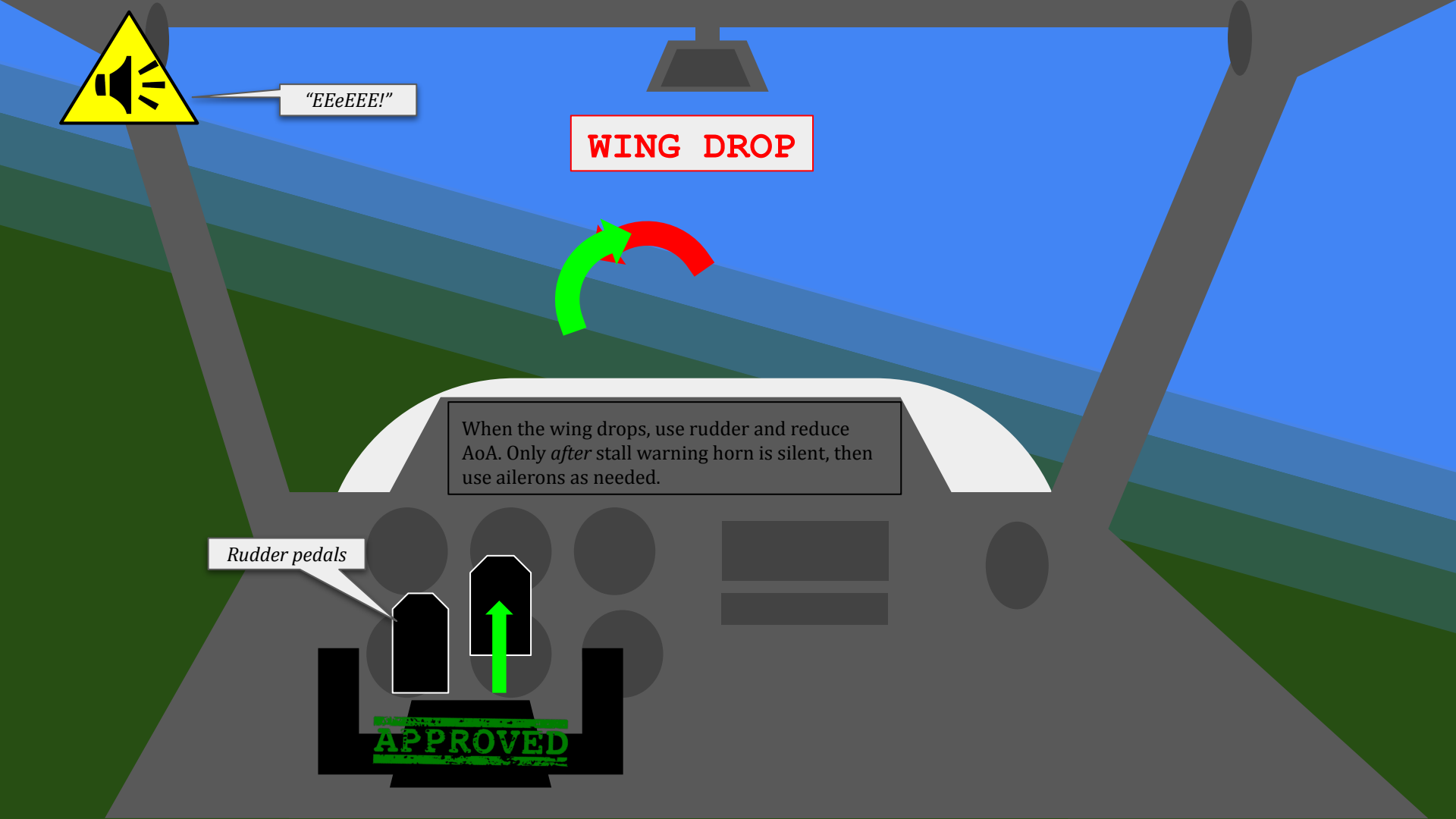
DO NOT USE AILERONS DURING STALL!

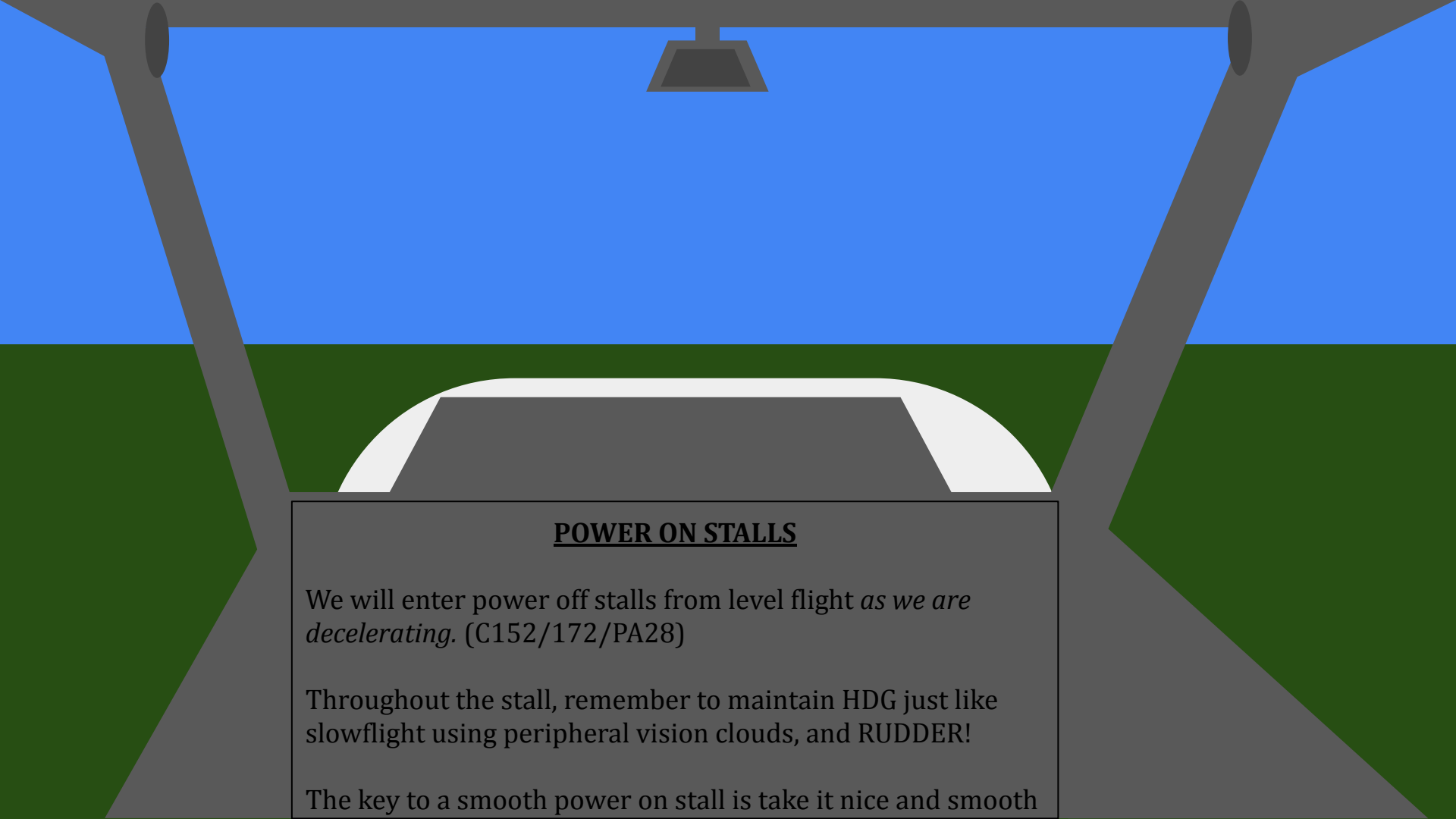
One aileron will go up, one will go down. This will cause asymmetric AoA, and ***WORSEN*** spinning!!!








"EEeEEE!"
WING DROP
When the wing drops, use rudder and reduce AoA. Only *after* stall warning horn is silent, then use ailerons as needed.
Rudder pedals
APPROVED

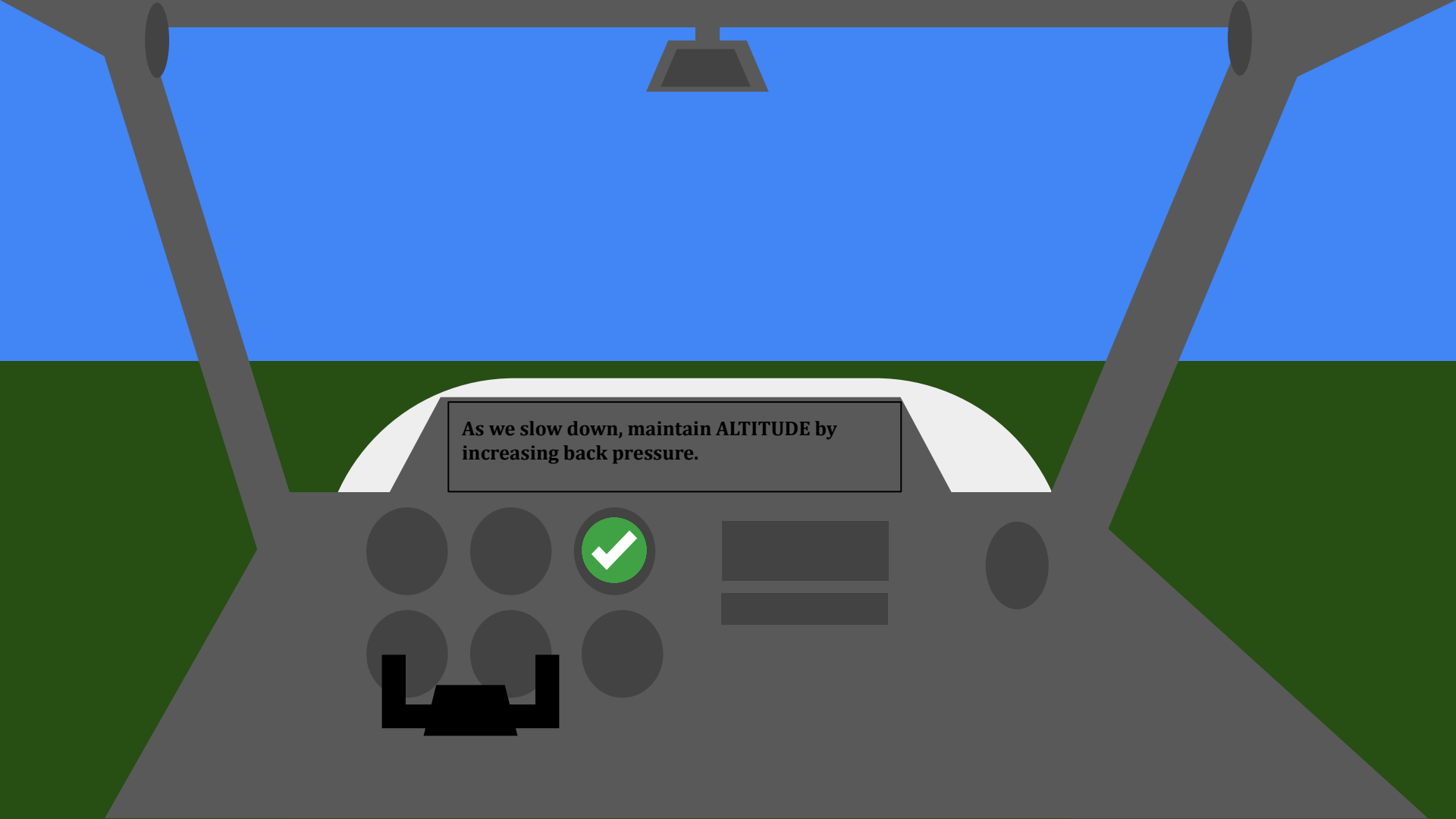


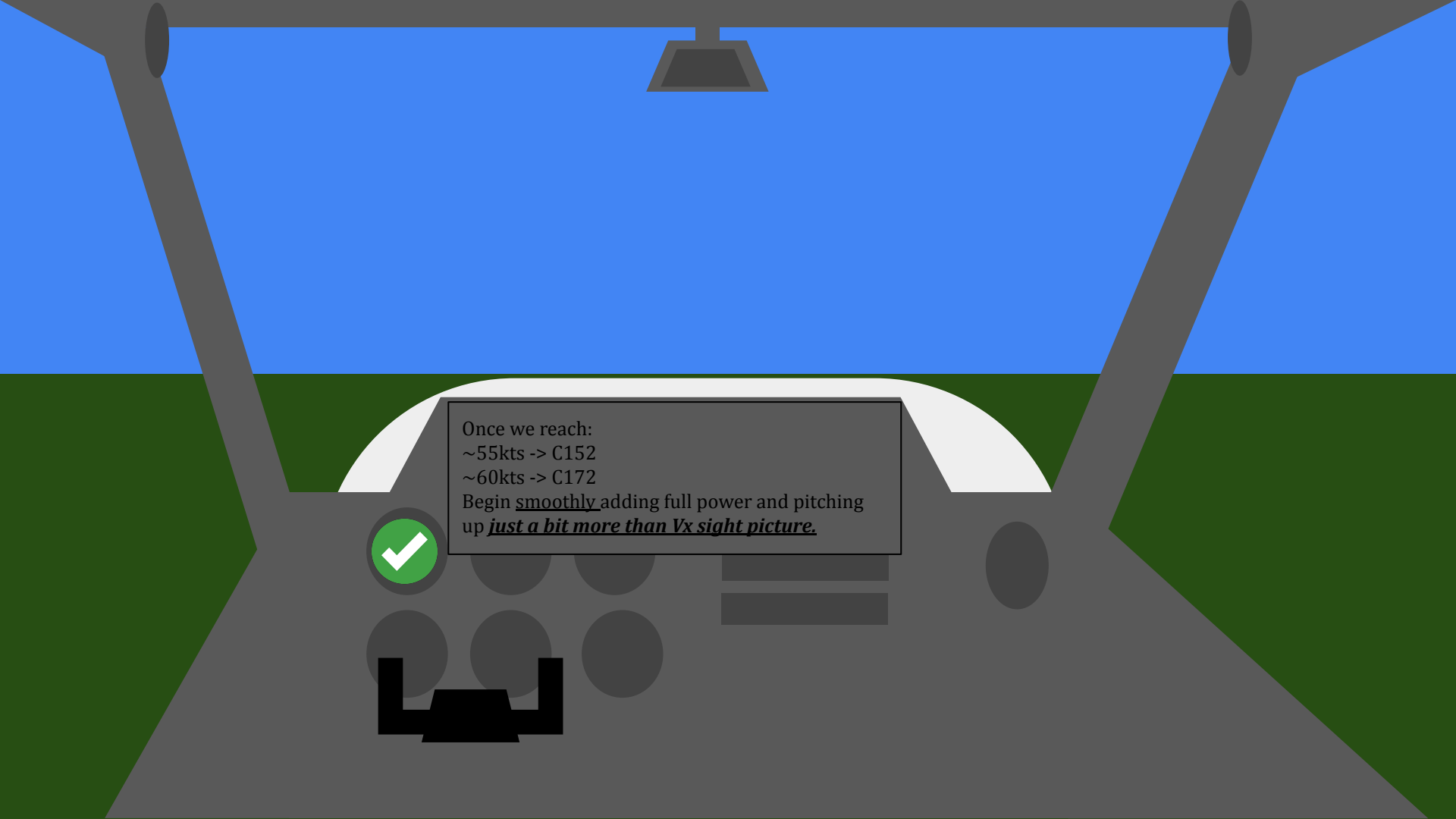
POWER ON STALLS

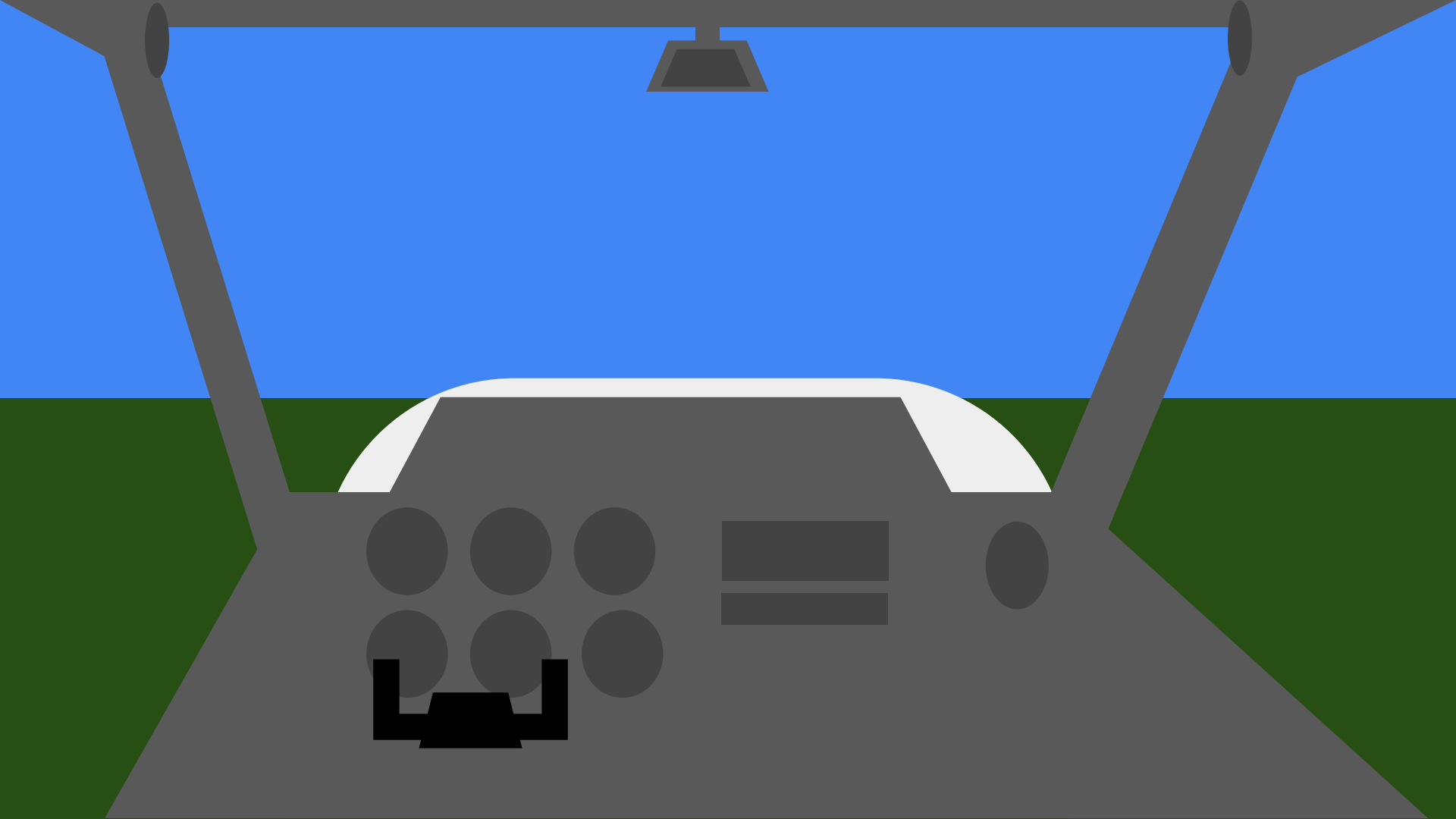
We will enter power off stalls from level flight *as we are decelerating.* (C152/172/PA28)

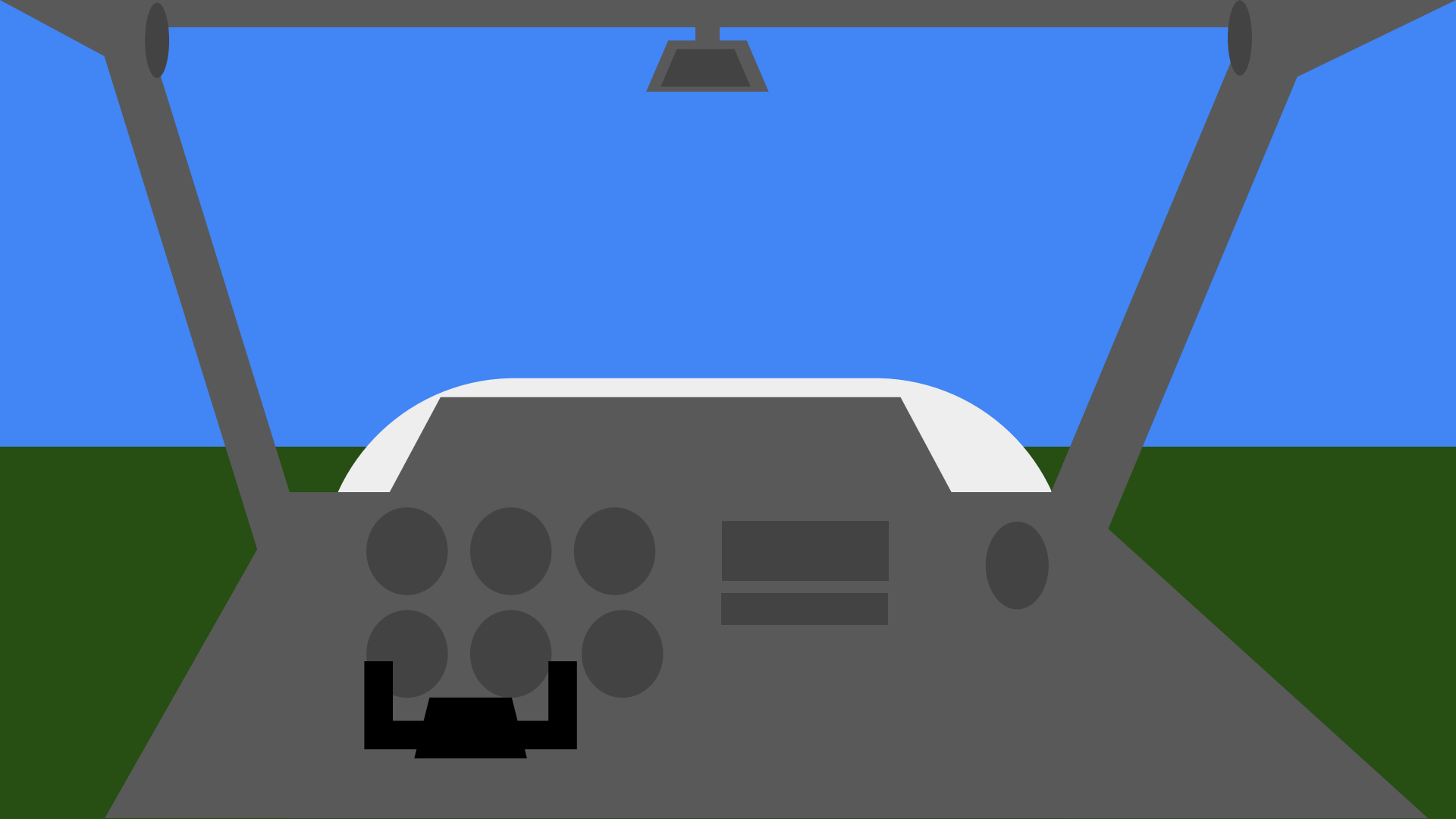
Throughout the stall, remember to maintain HDG just like slowflight using peripheral vision clouds, and RUDDER!

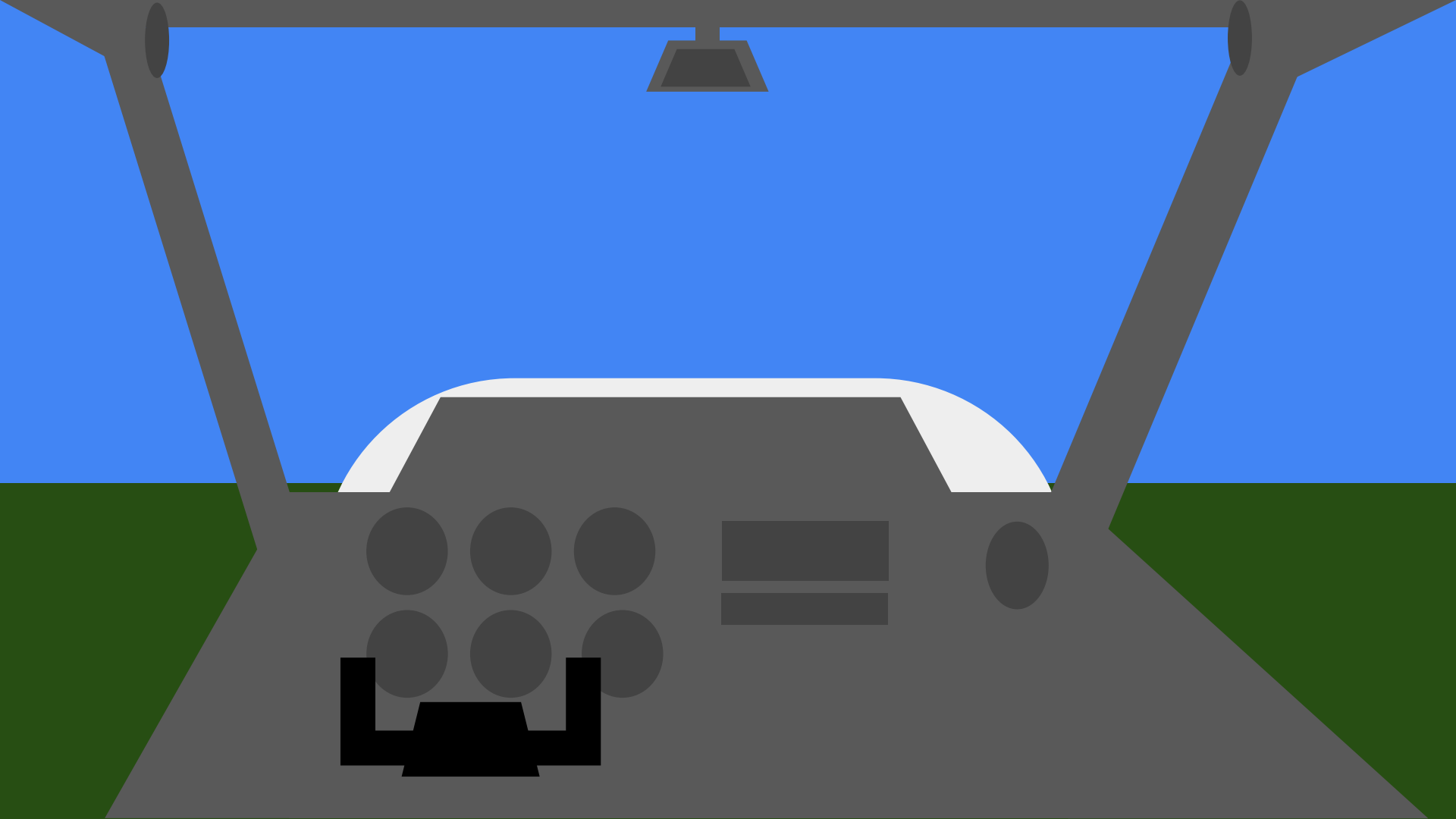
The key to a smooth power on stall is take it nice and smooth

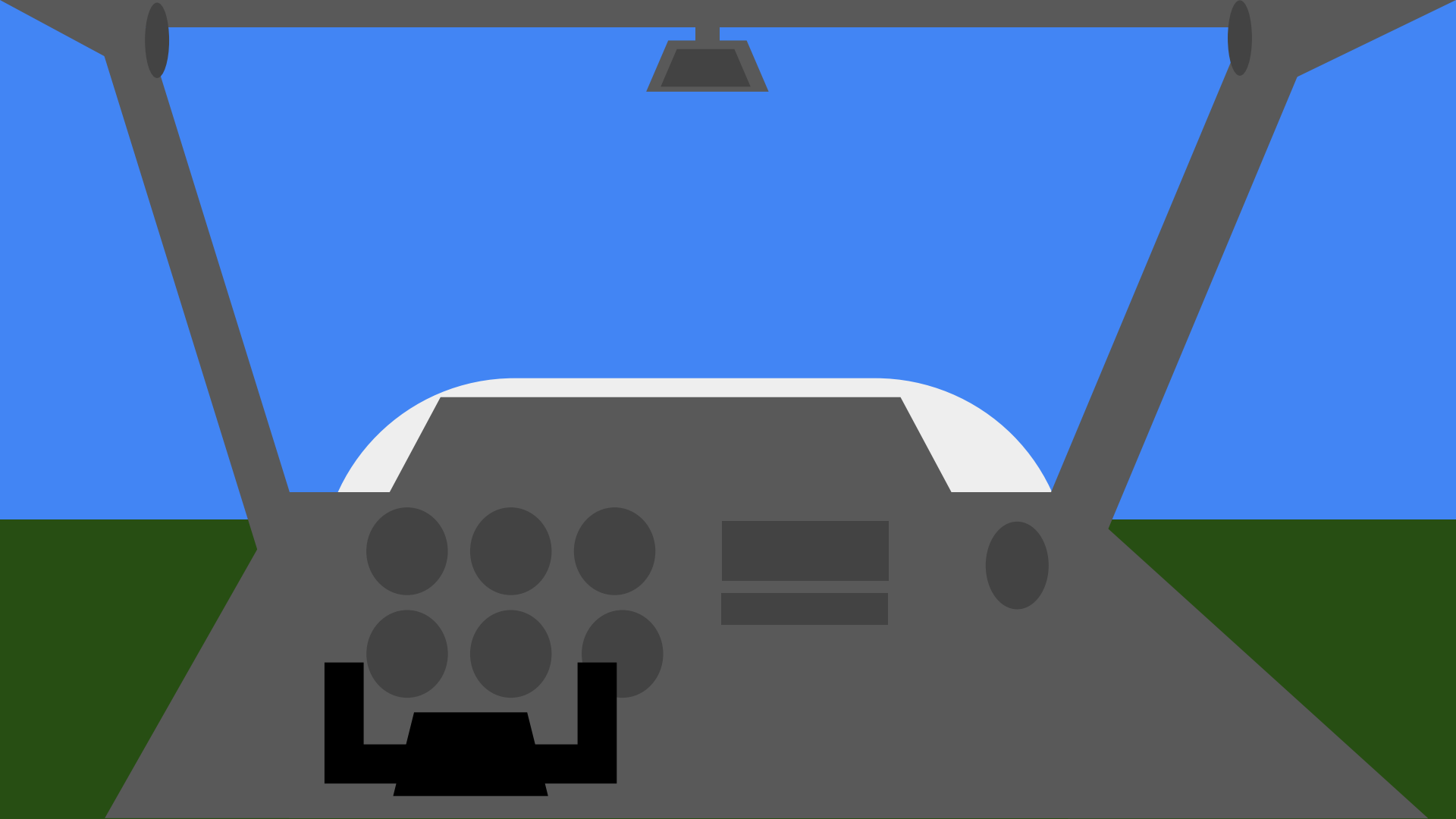

As we slow down, maintain ALTITUDE by increasing back pressure.

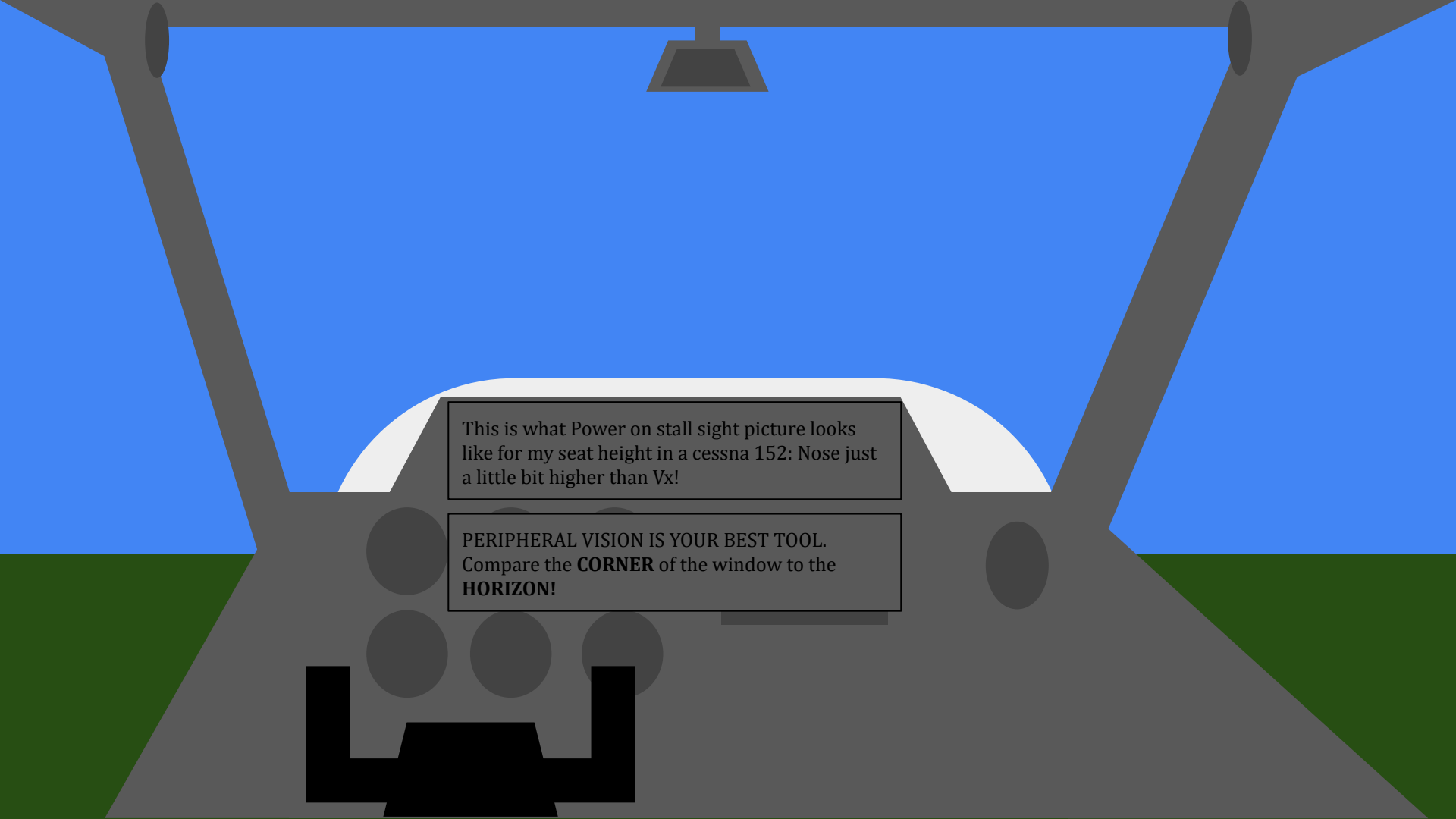

Once we reach:
~55kts -> C152
~60kts -> C172
Begin smoothly adding full power and pitching up ***just a bit more than Vx sight picture.***

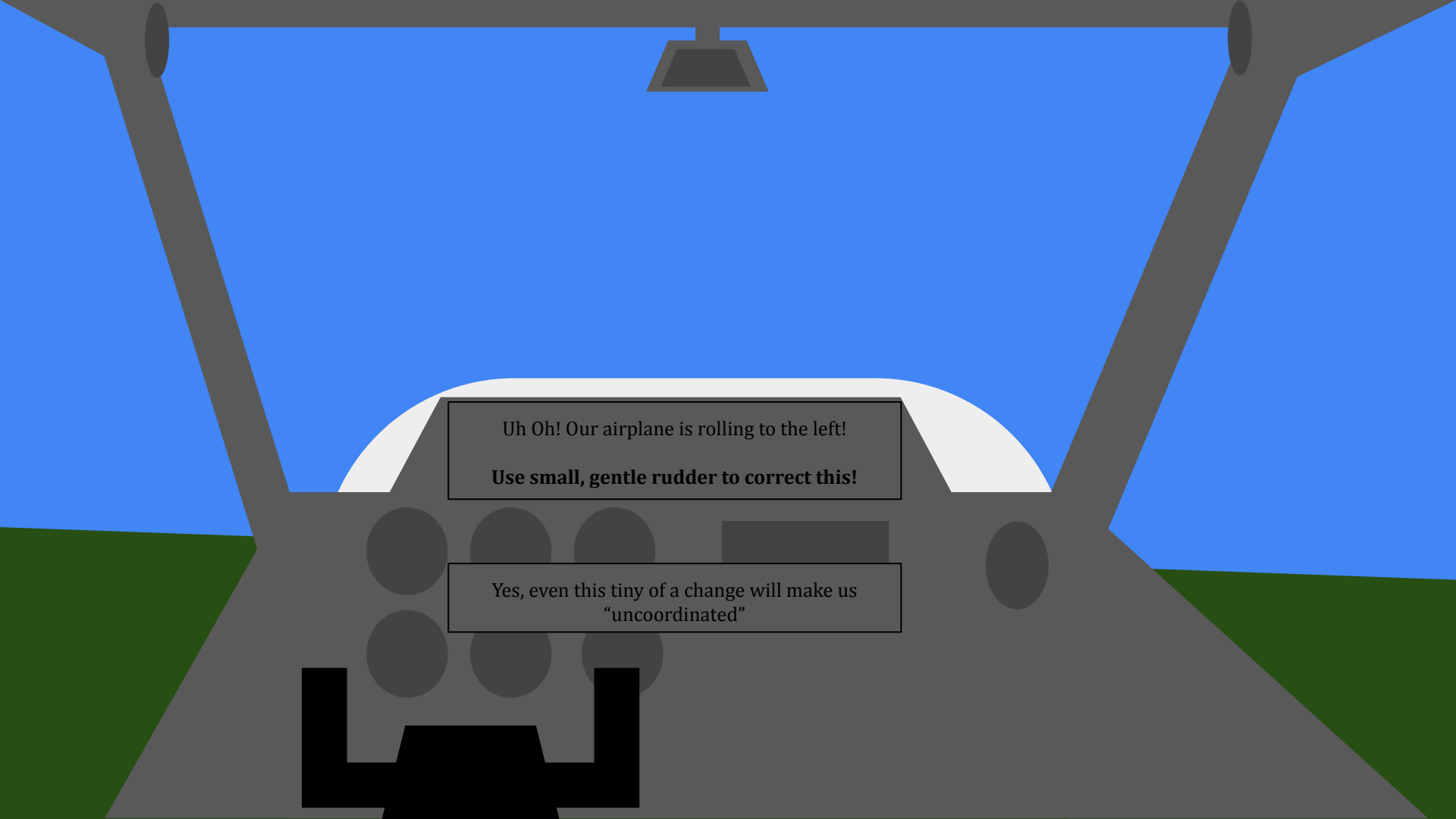


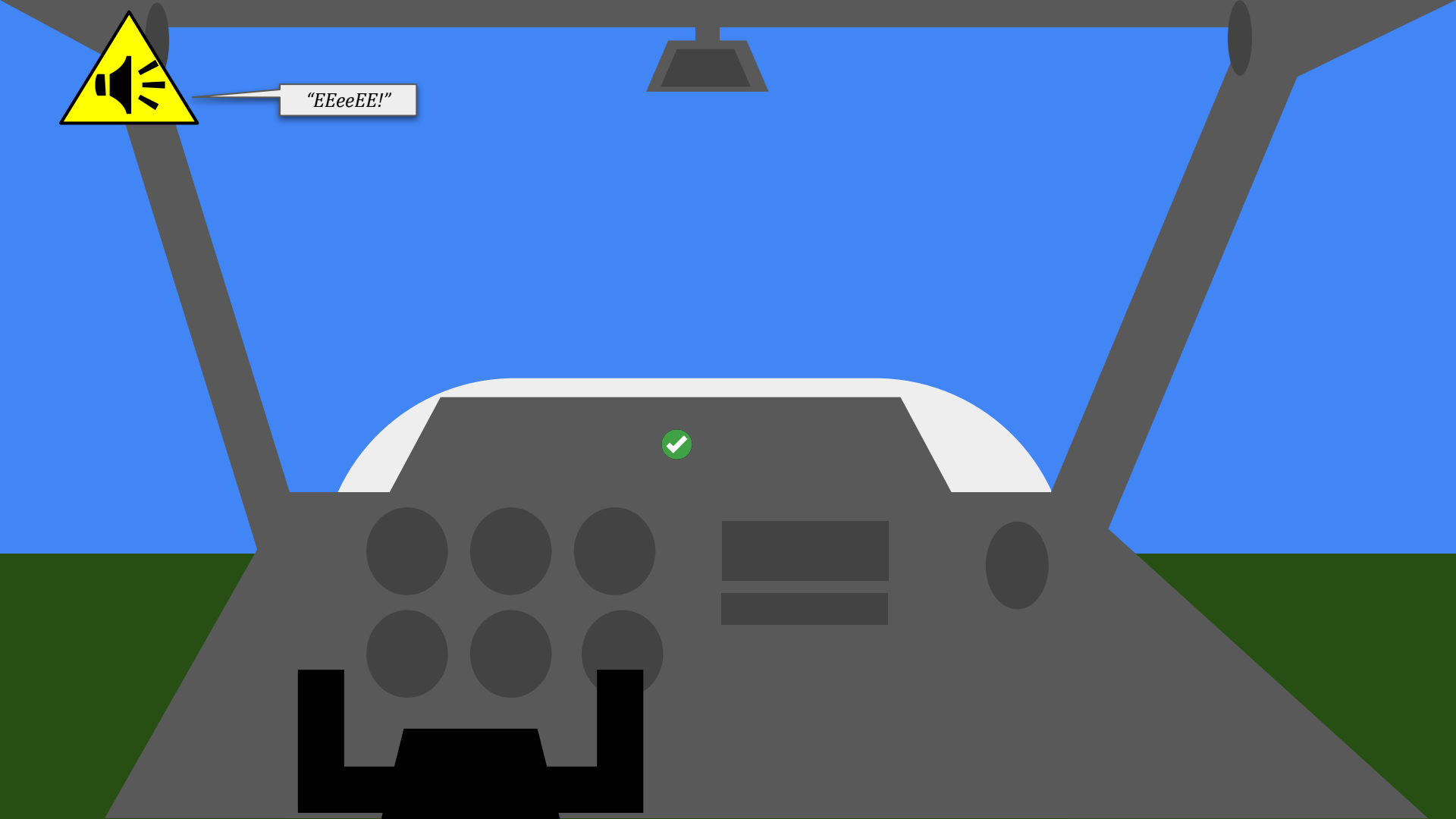


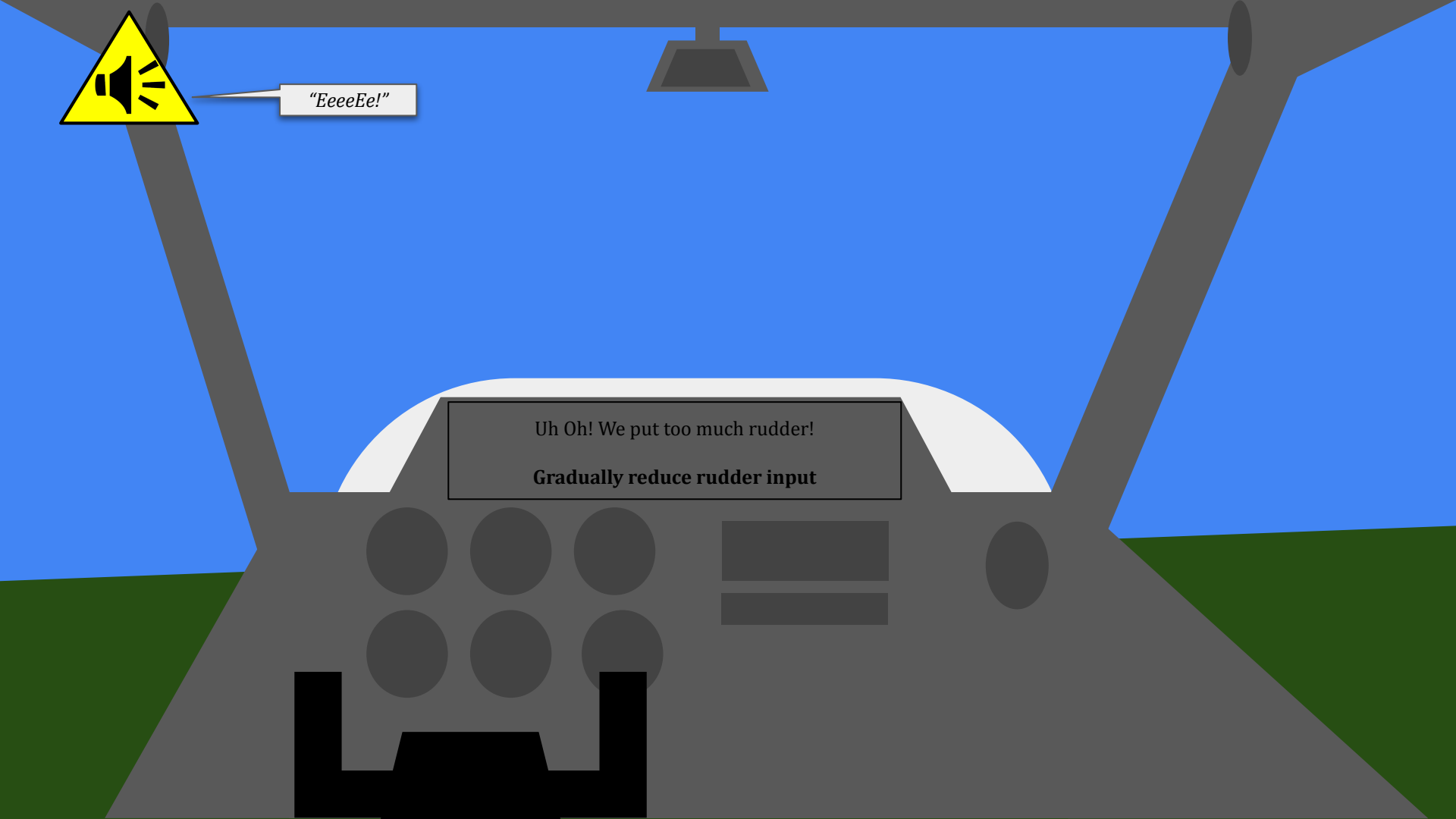


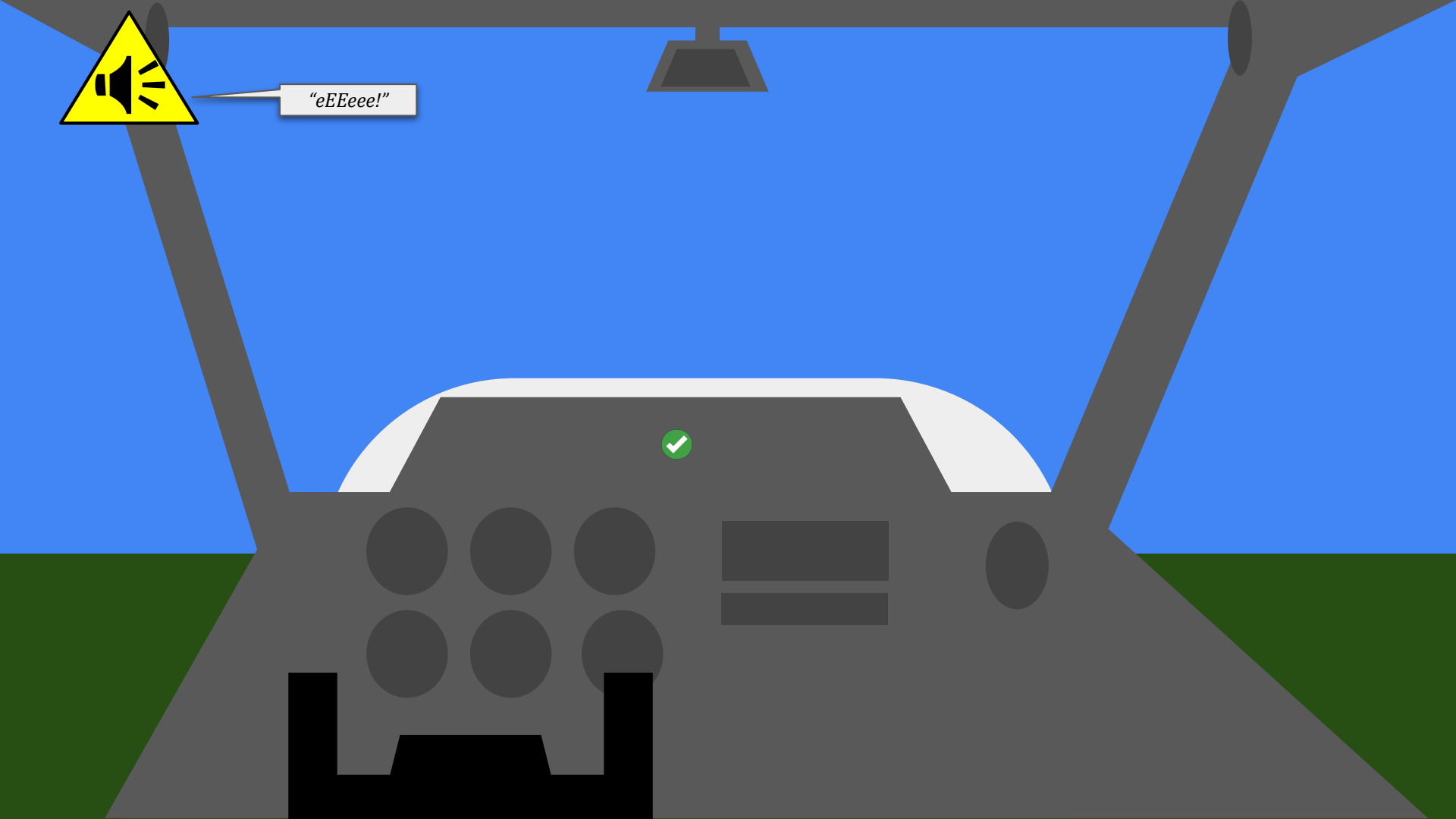


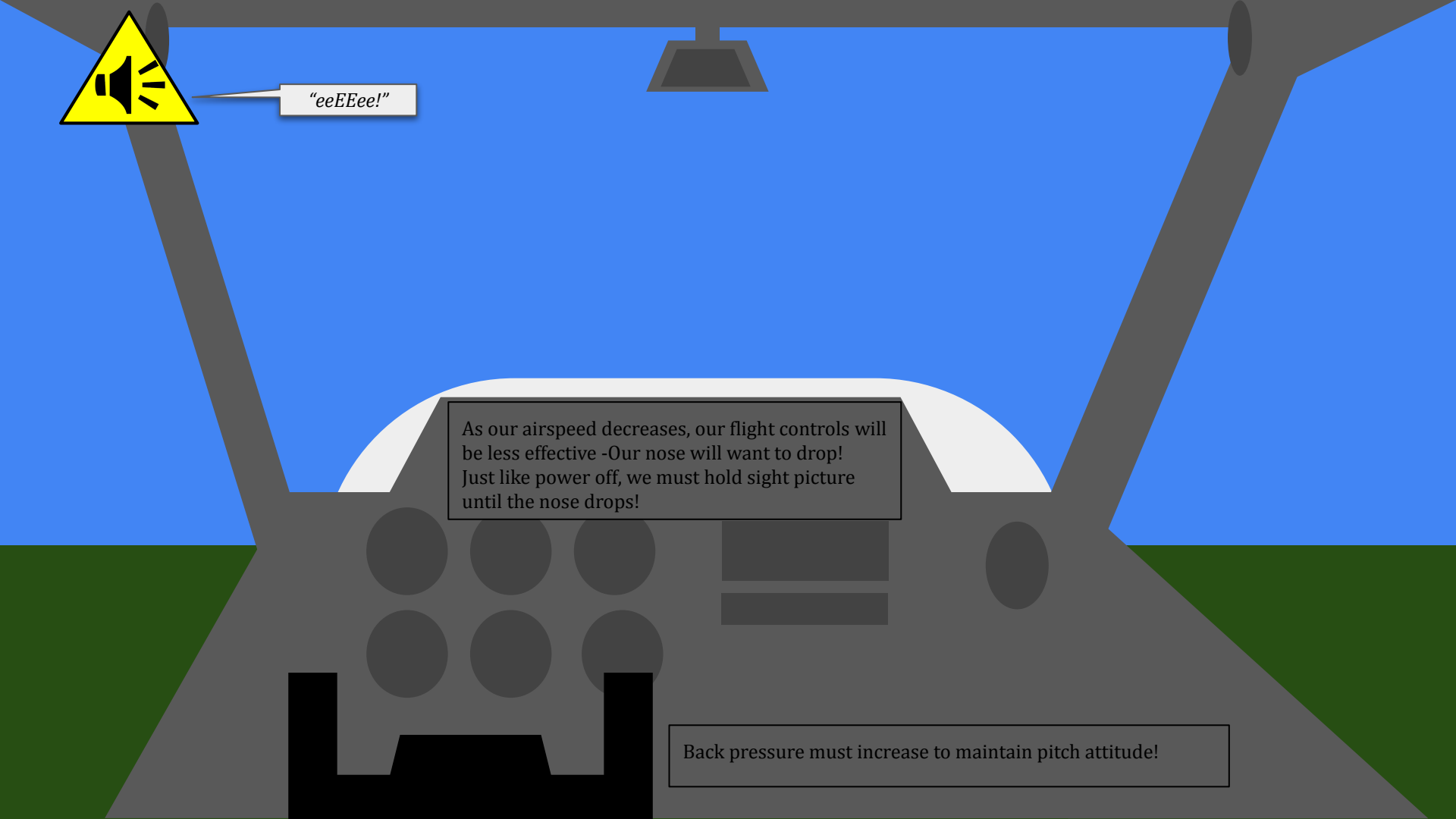

This is what Power on stall sight picture looks like for my seat height in a cessna 152: Nose just a little bit higher than Vx!
PERIPHERAL VISION IS YOUR BEST TOOL. Compare the **CORNER** of the window to the **HORIZON!**

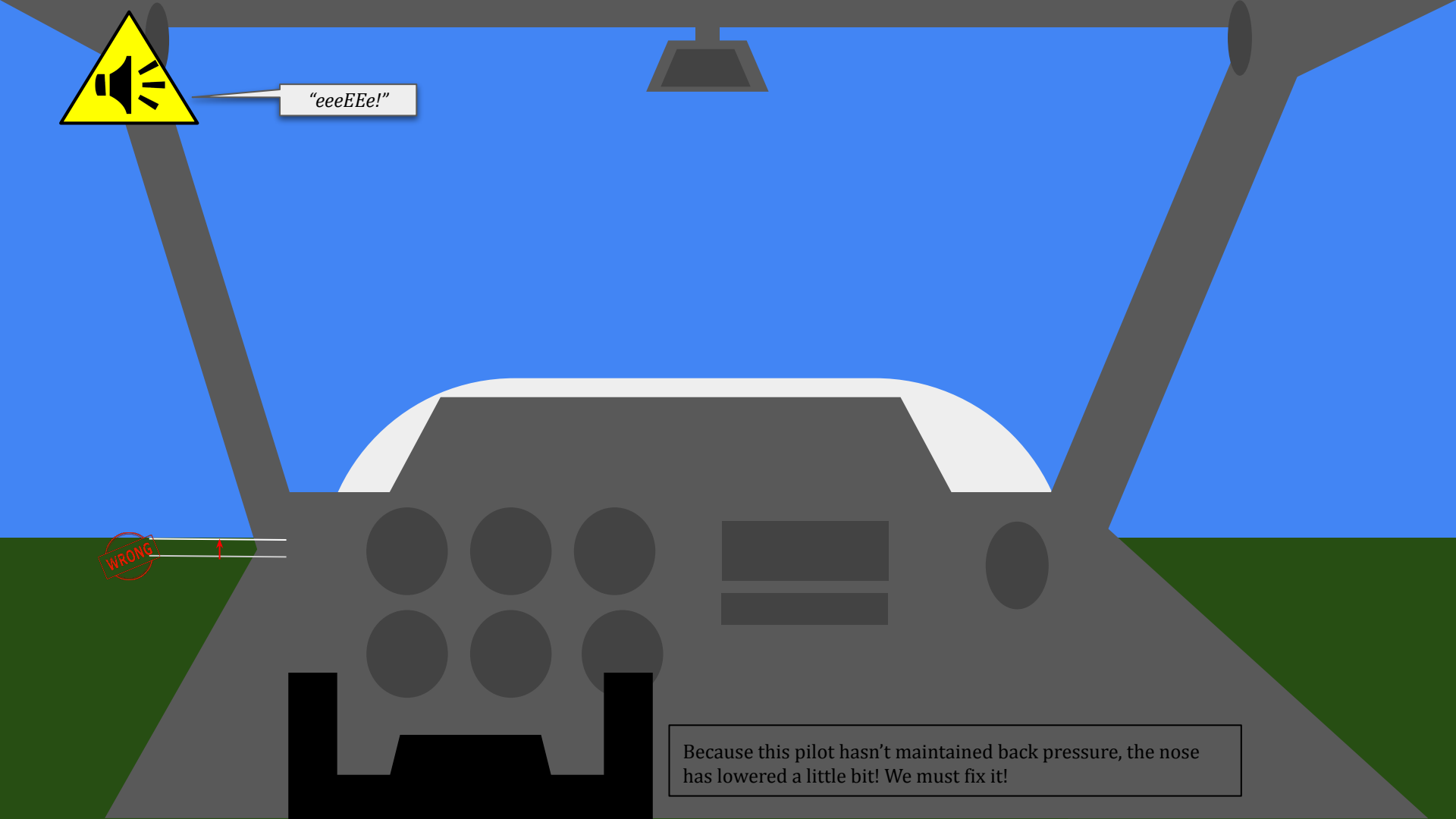

Uh Oh! Our airplane is rolling to the left!
Use small, gentle rudder to correct this!
Yes, even this tiny of a change will make us "uncoordinated"

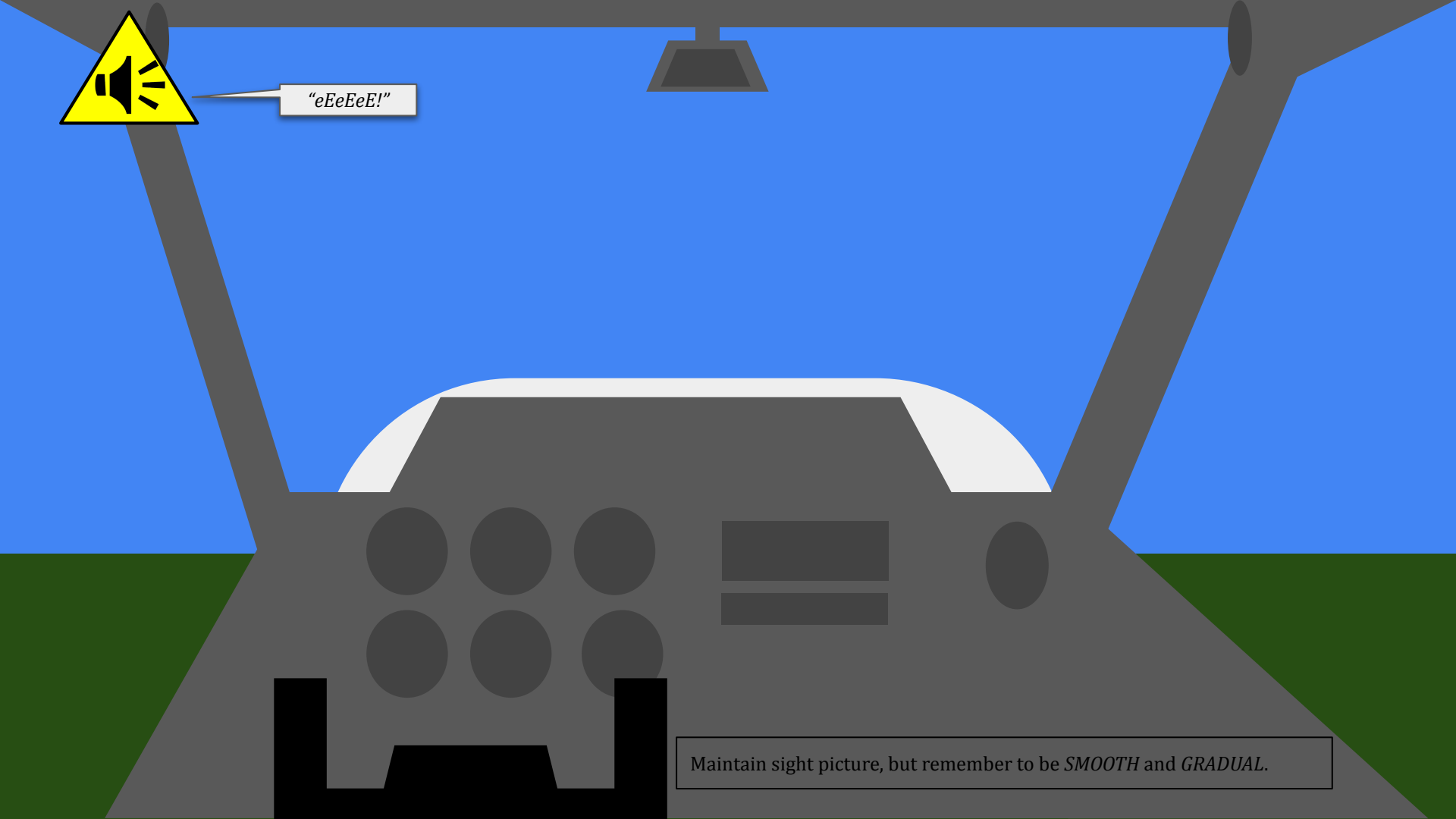

“EEeeEE!”


"EeeeEe!"
Uh Oh! We put too much rudder!
Gradually reduce rudder input

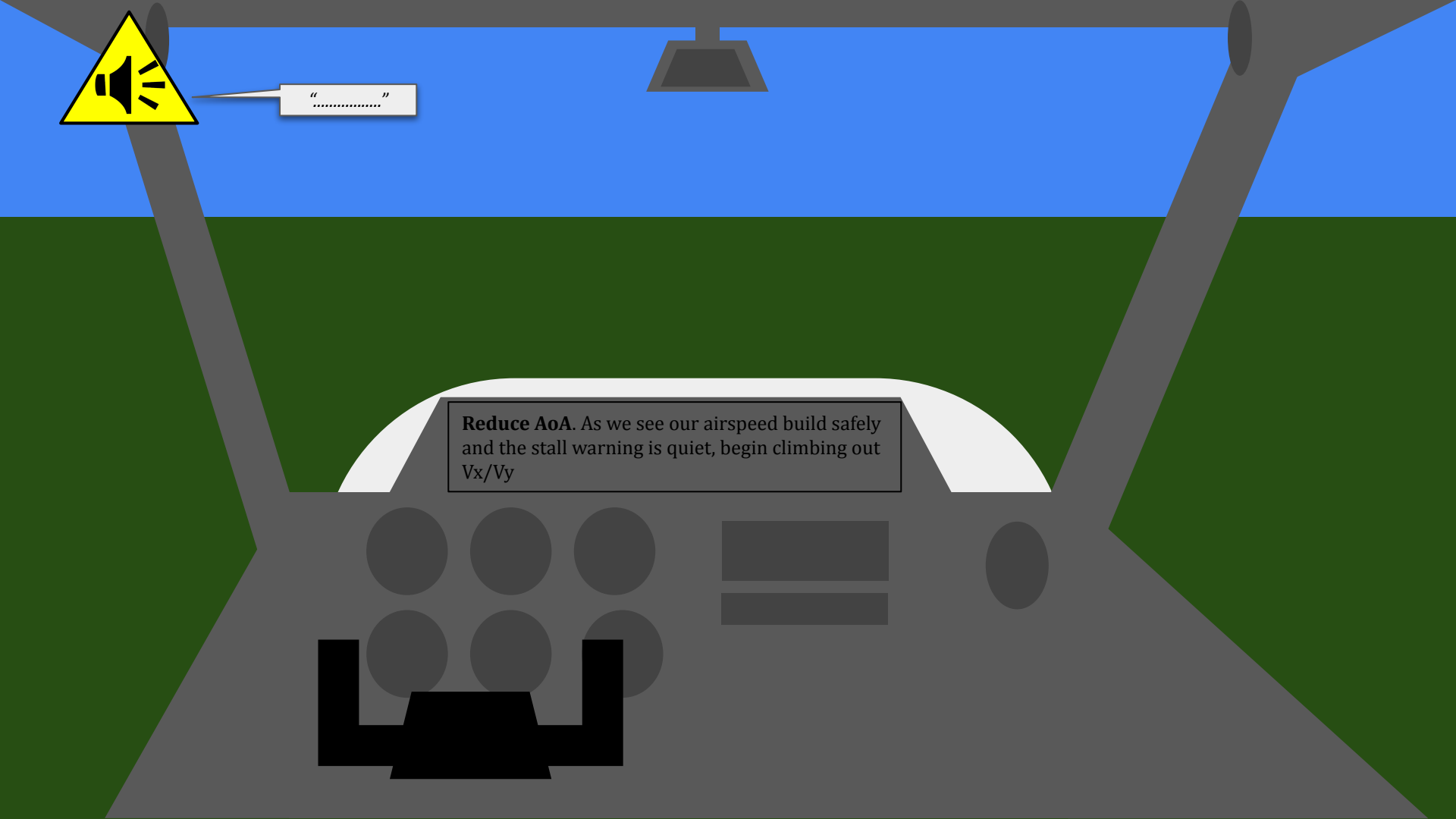

“eEEeee!”

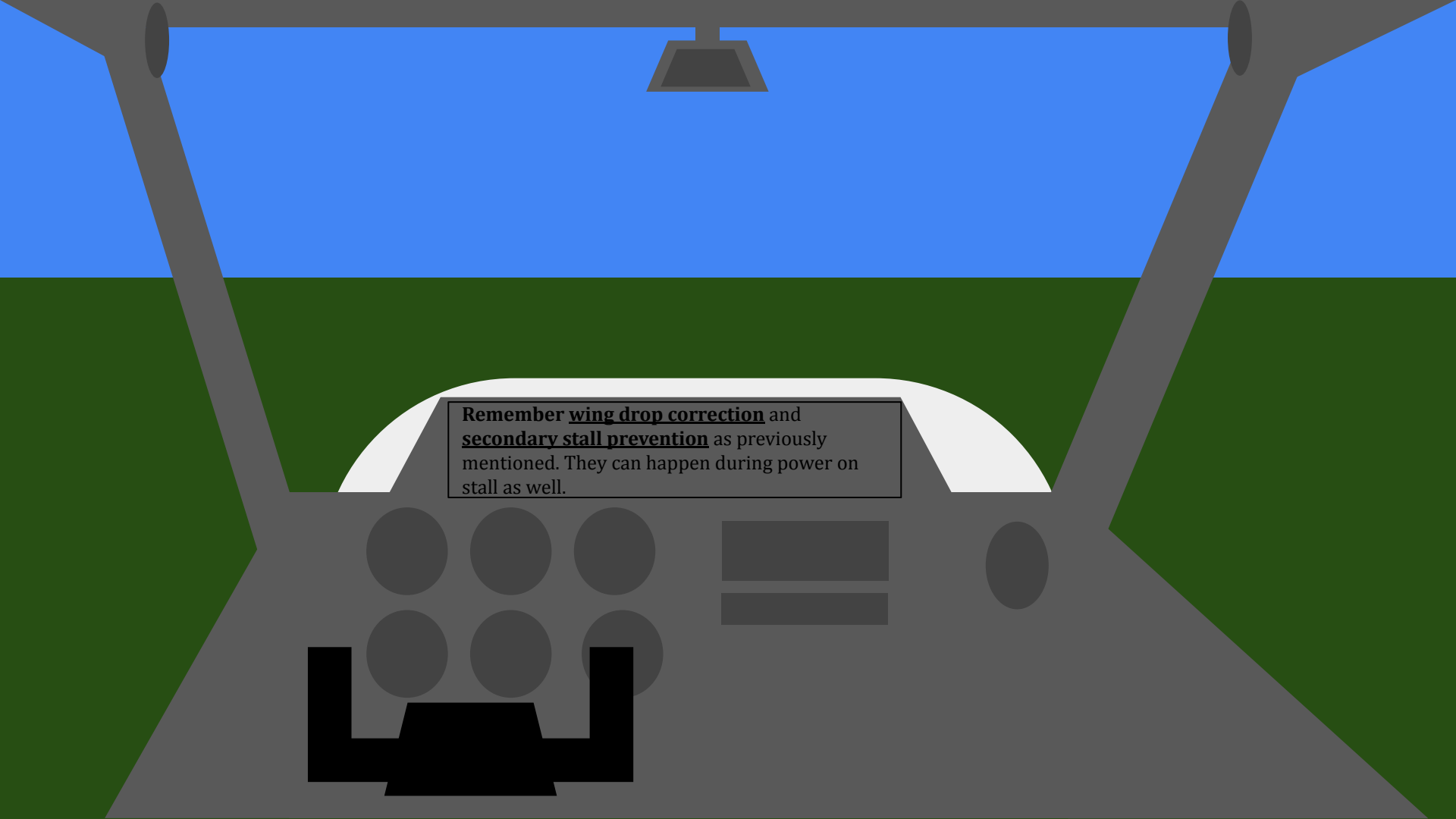

“eeEEee!”
As our airspeed decreases, our flight controls will be less effective -Our nose will want to drop! Just like power off, we must hold sight picture until the nose drops!
Back pressure must increase to maintain pitch attitude!

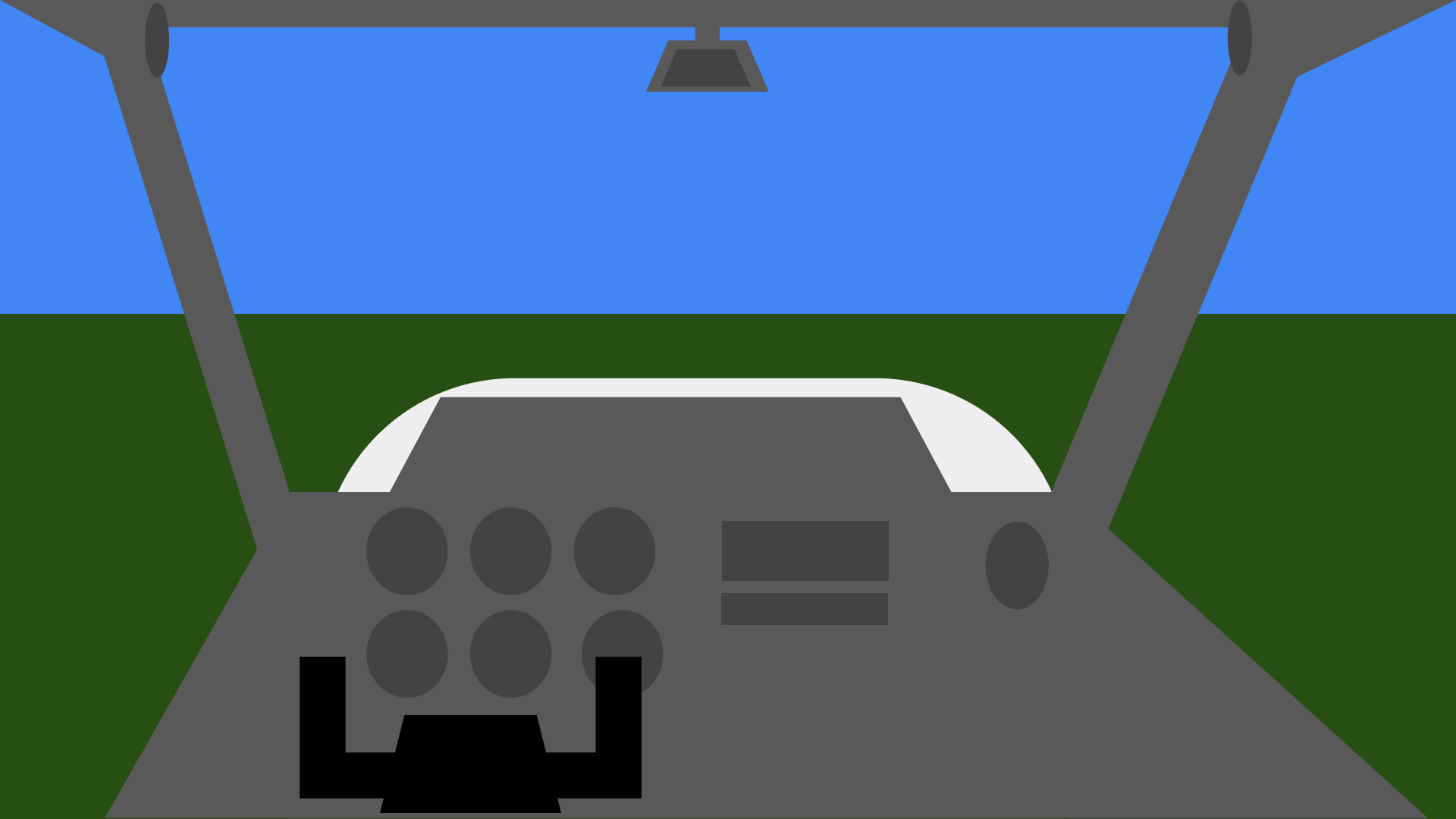

"eeeEEe!"
WRONG
Because this pilot hasn't maintained back pressure, the nose has lowered a little bit! We must fix it!

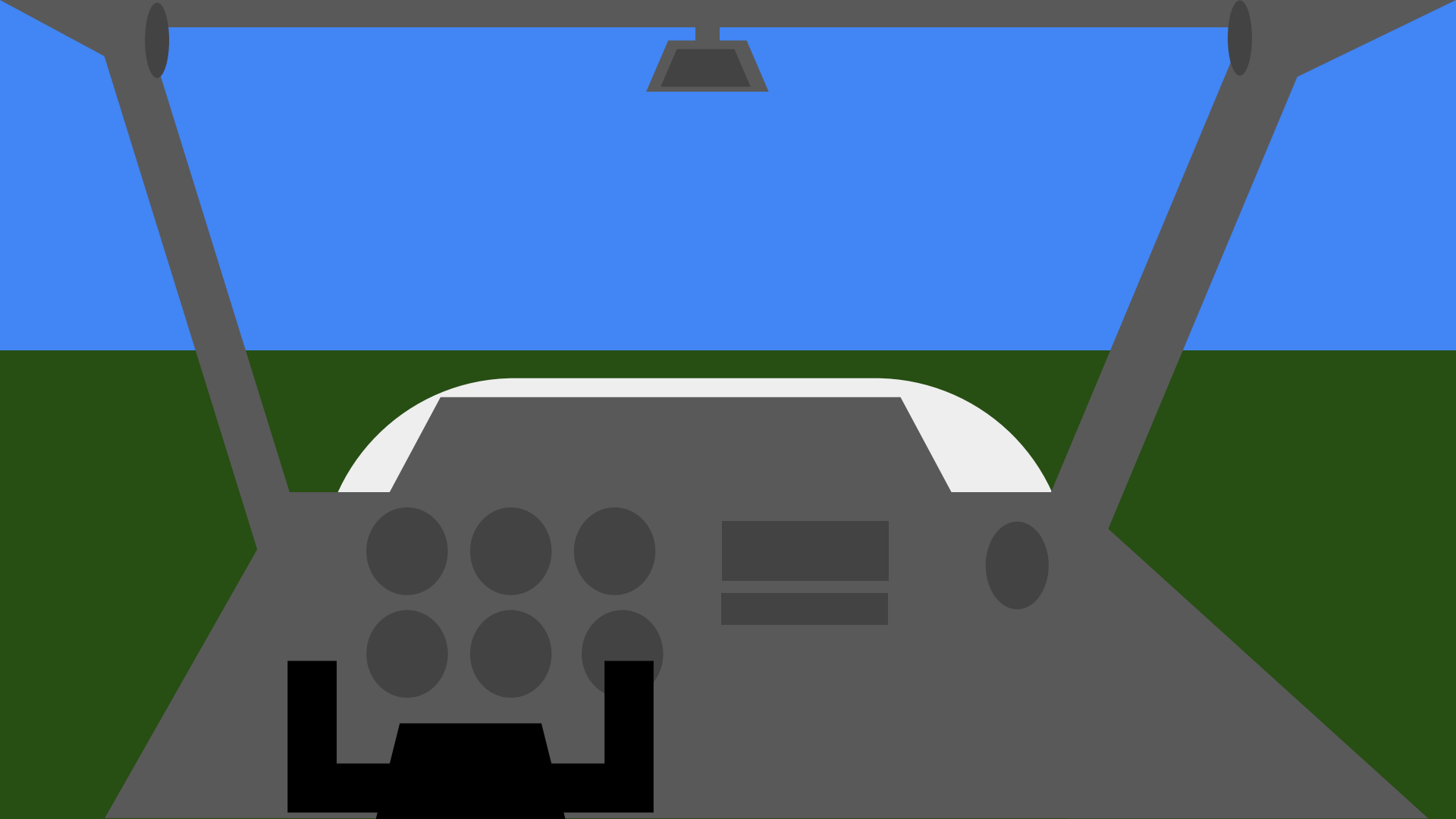

“eEeEeE!”
Maintain sight picture, but remember to be *SMOOTH* and *GRADUAL*.

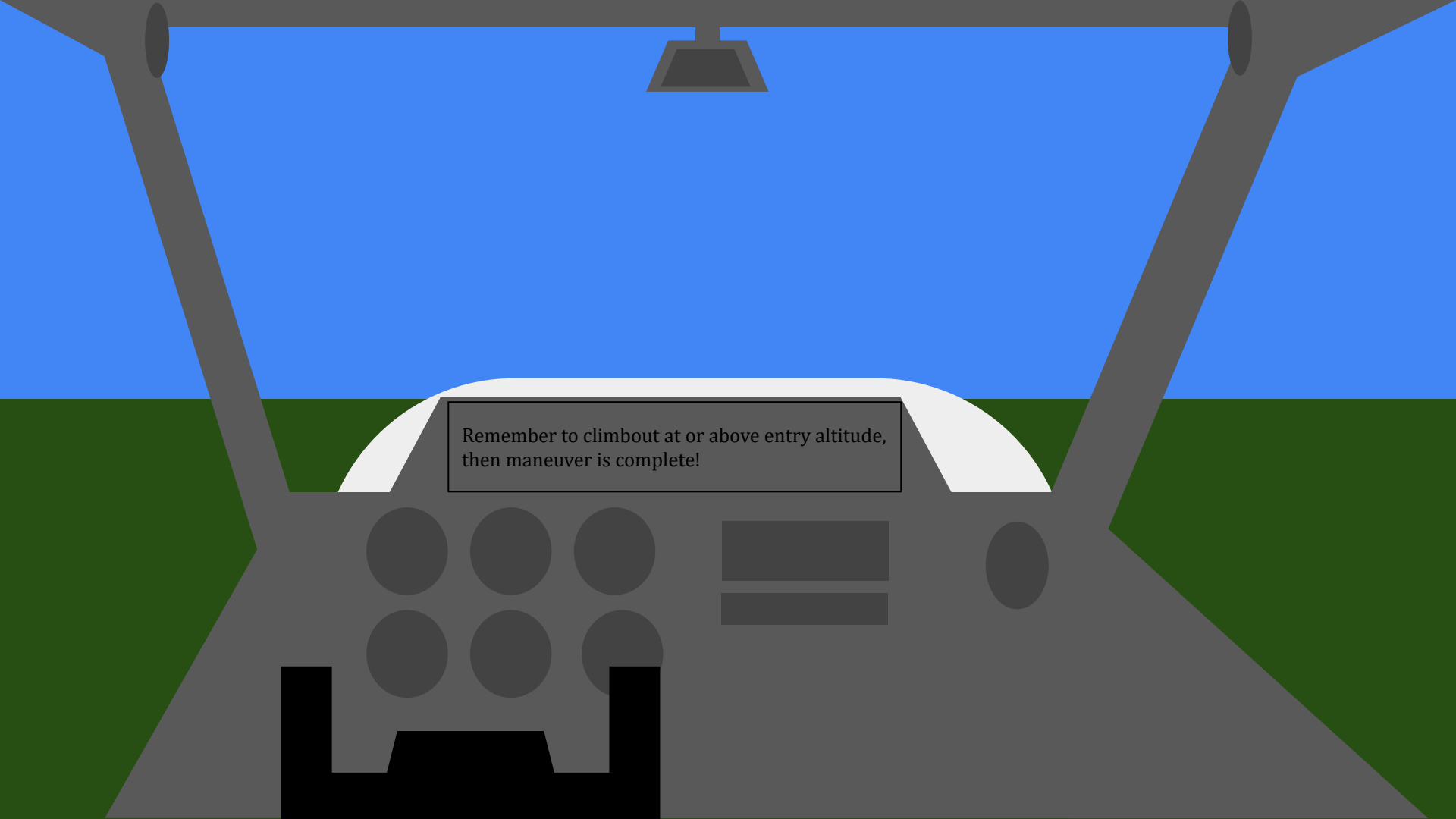

"EEEEEE!"
The nose is dropping again.
NOW WE NEED TO **RECOVER** FROM THE STALL

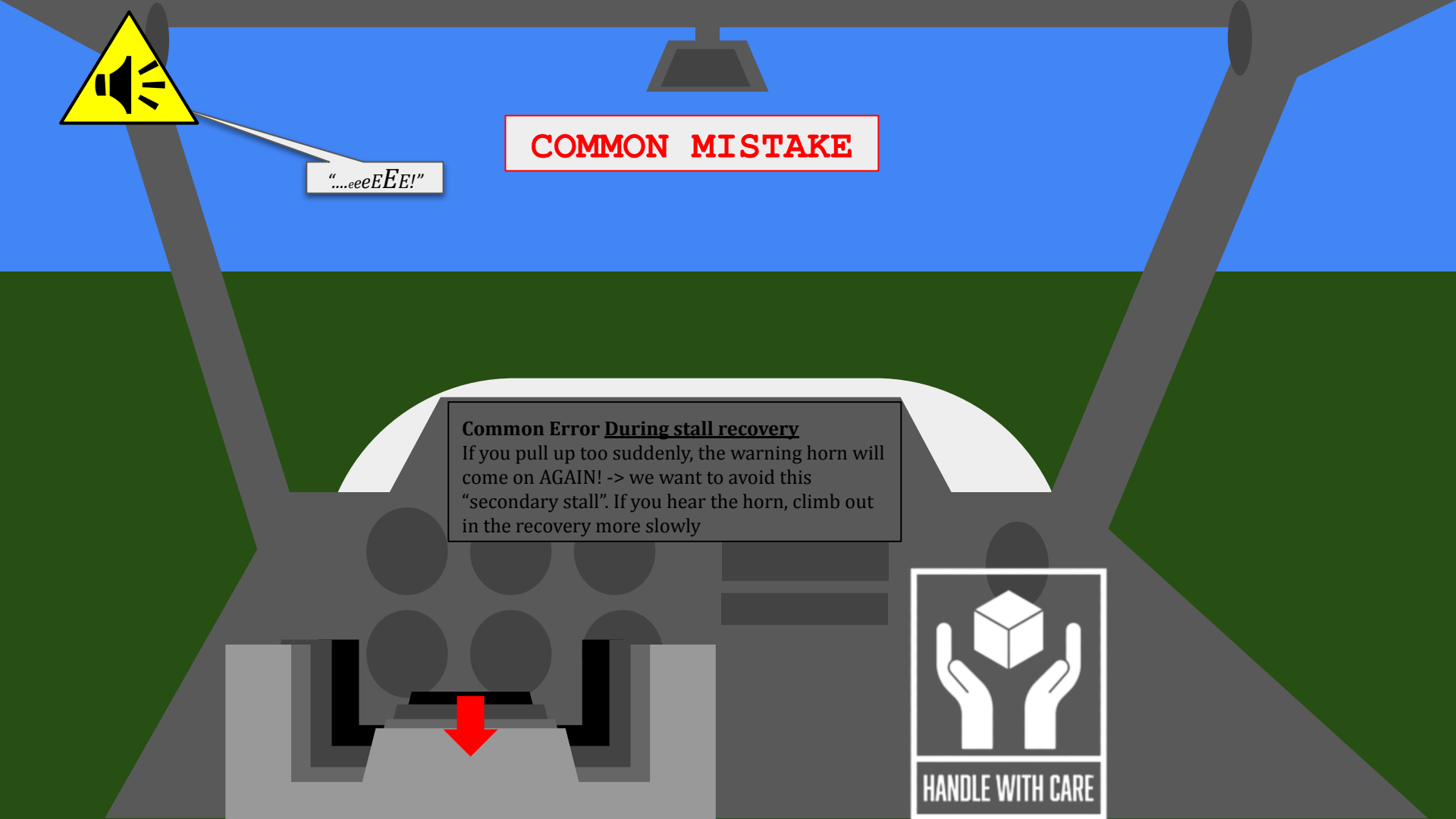

“ ..... ”
Reduce AoA. As we see our airspeed build safely and the stall warning is quiet, begin climbing out Vx/Vy

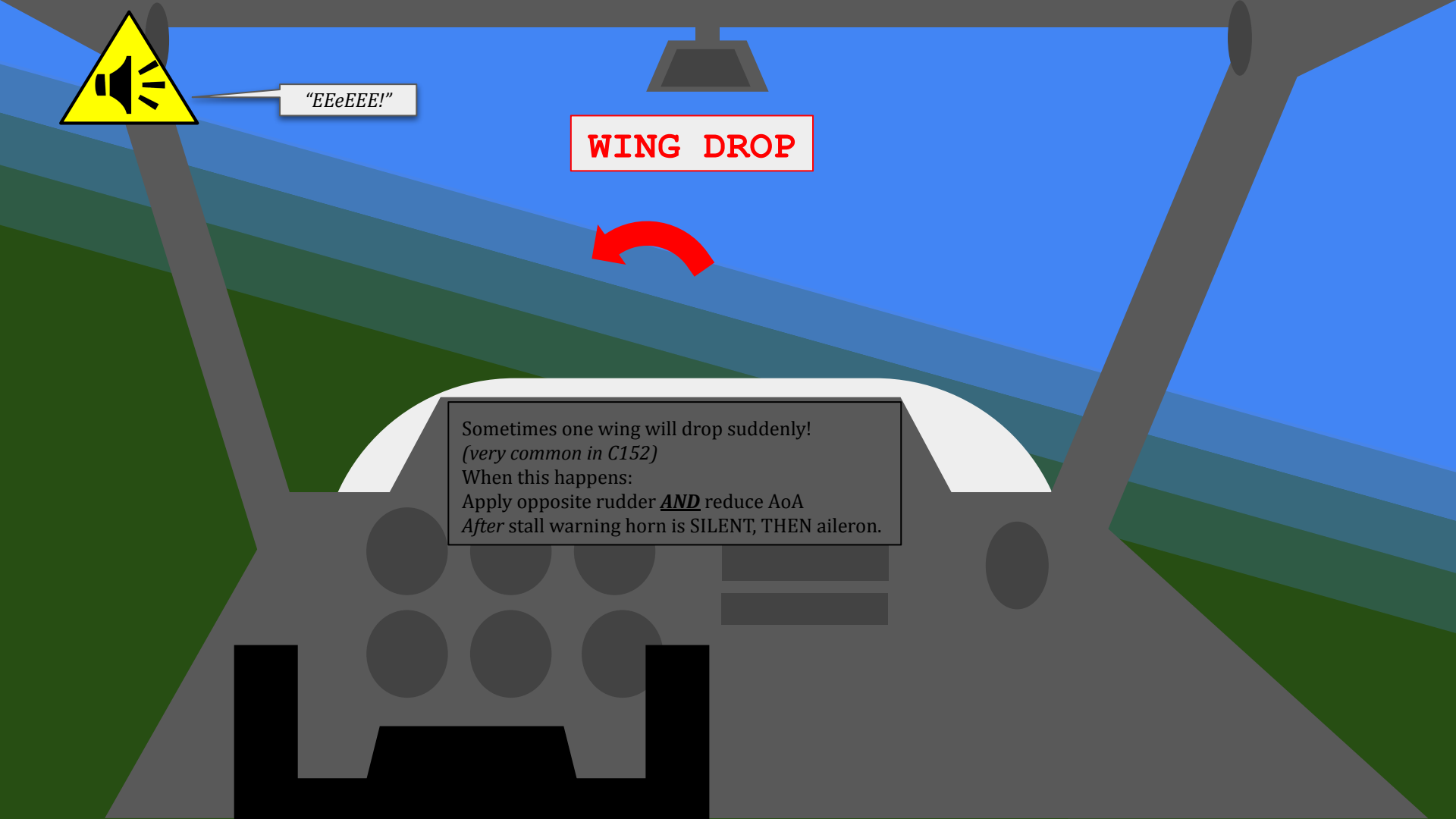

Remember <u>wing drop correction</u> and **<u>secondary stall prevention</u>** as previously mentioned. They can happen during power on stall as well.

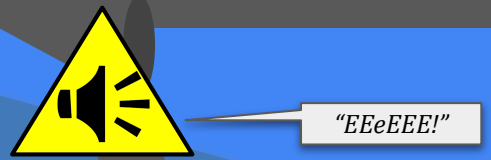





Remember to climbout at or above entry altitude, then maneuver is complete!


"....eeeEEE!"
COMMON MISTAKE
Common Error During stall recovery
If you pull up too suddenly, the warning horn will come on AGAIN! -> we want to avoid this "secondary stall". If you hear the horn, climb out in the recovery more slowly
HANDLE WITH CARE


"EEeEEE!"
WING DROP
Sometimes one wing will drop suddenly!
(very common in C152)
When this happens:
Apply opposite rudder ***AND*** reduce AoA
After stall warning horn is SILENT, THEN aileron.

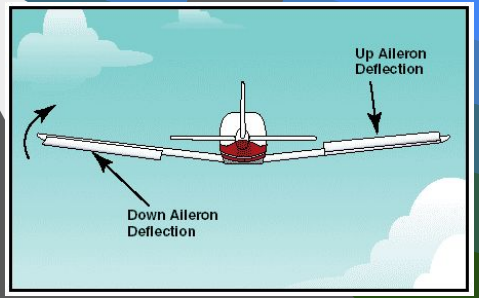


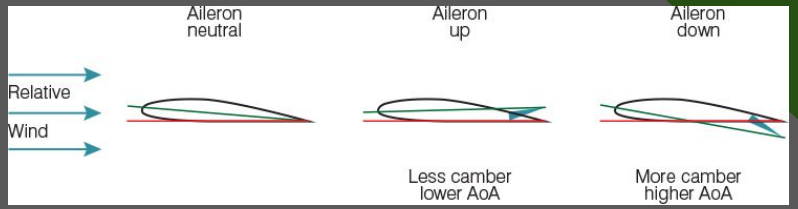
"EEeEEE!"

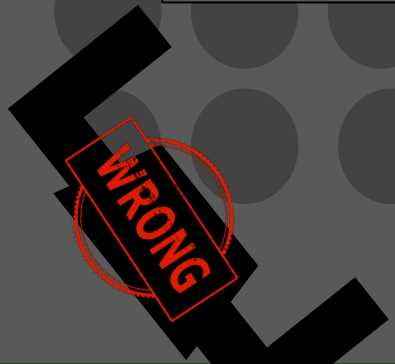
WING DROP

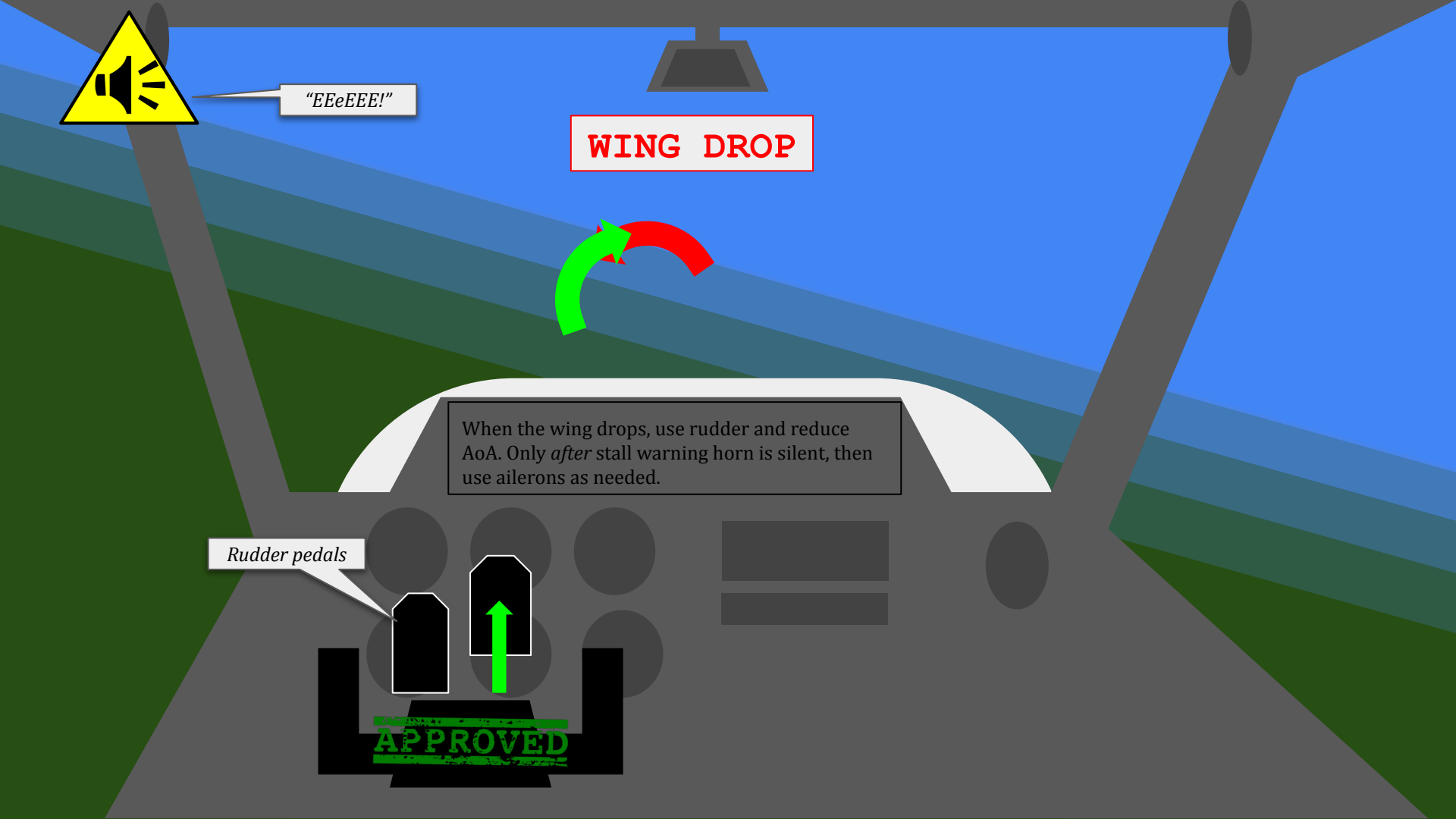
DO NOT USE AILERONS DURING STALL!

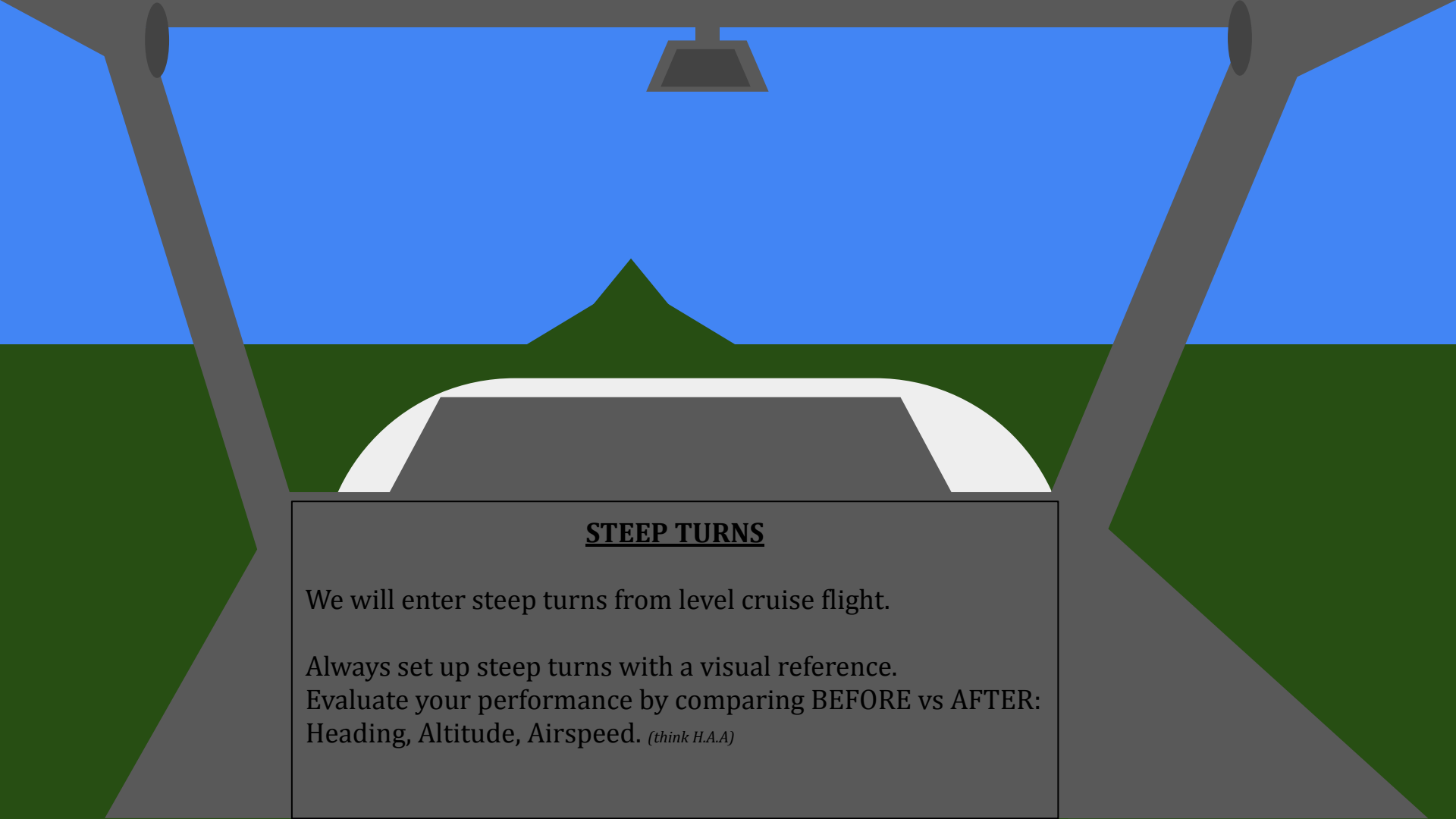
One aileron will go up, one will go down. This will cause asymmetric AoA, and ***WORSEN*** spinning!!!







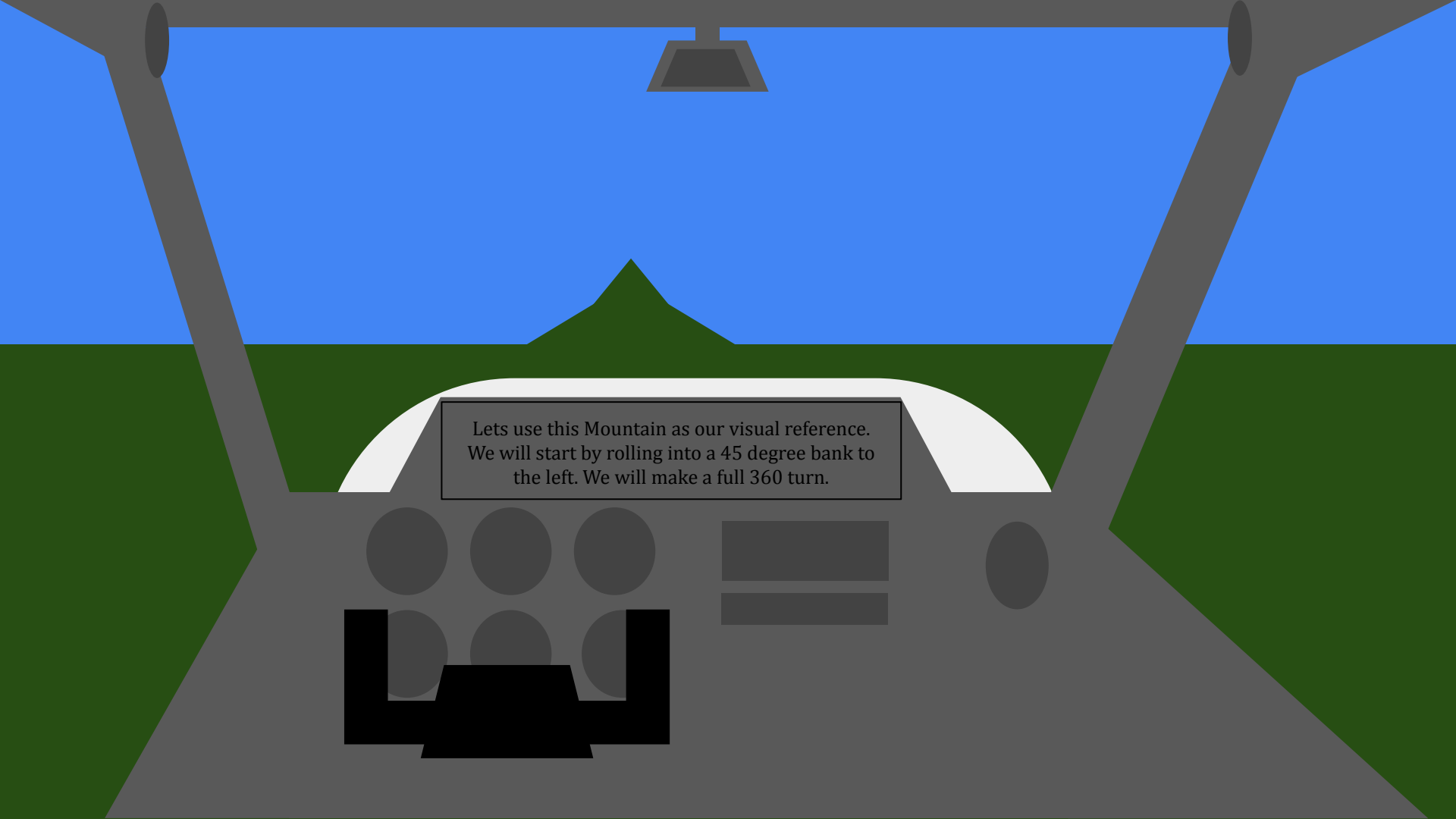

"EEeEEE!"
WING DROP
When the wing drops, use rudder and reduce AoA. Only *after* stall warning horn is silent, then use ailerons as needed.
Rudder pedals
APPROVED

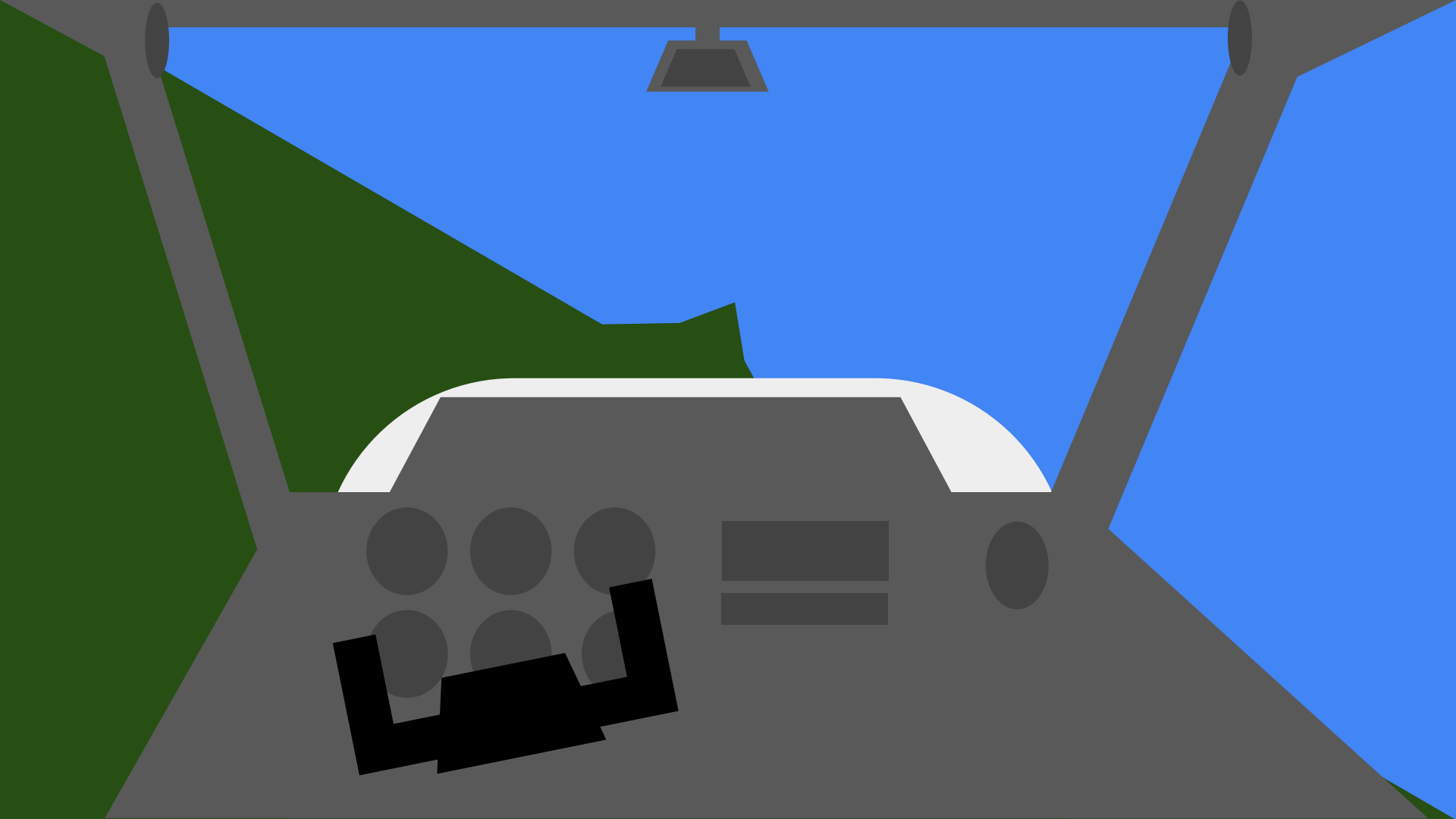


STEEP TURNS

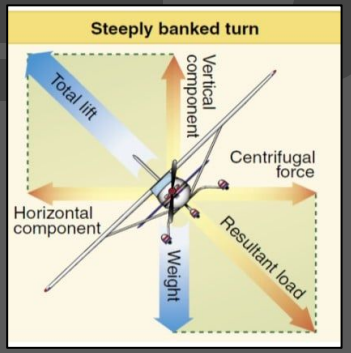
We will enter steep turns from level cruise flight.

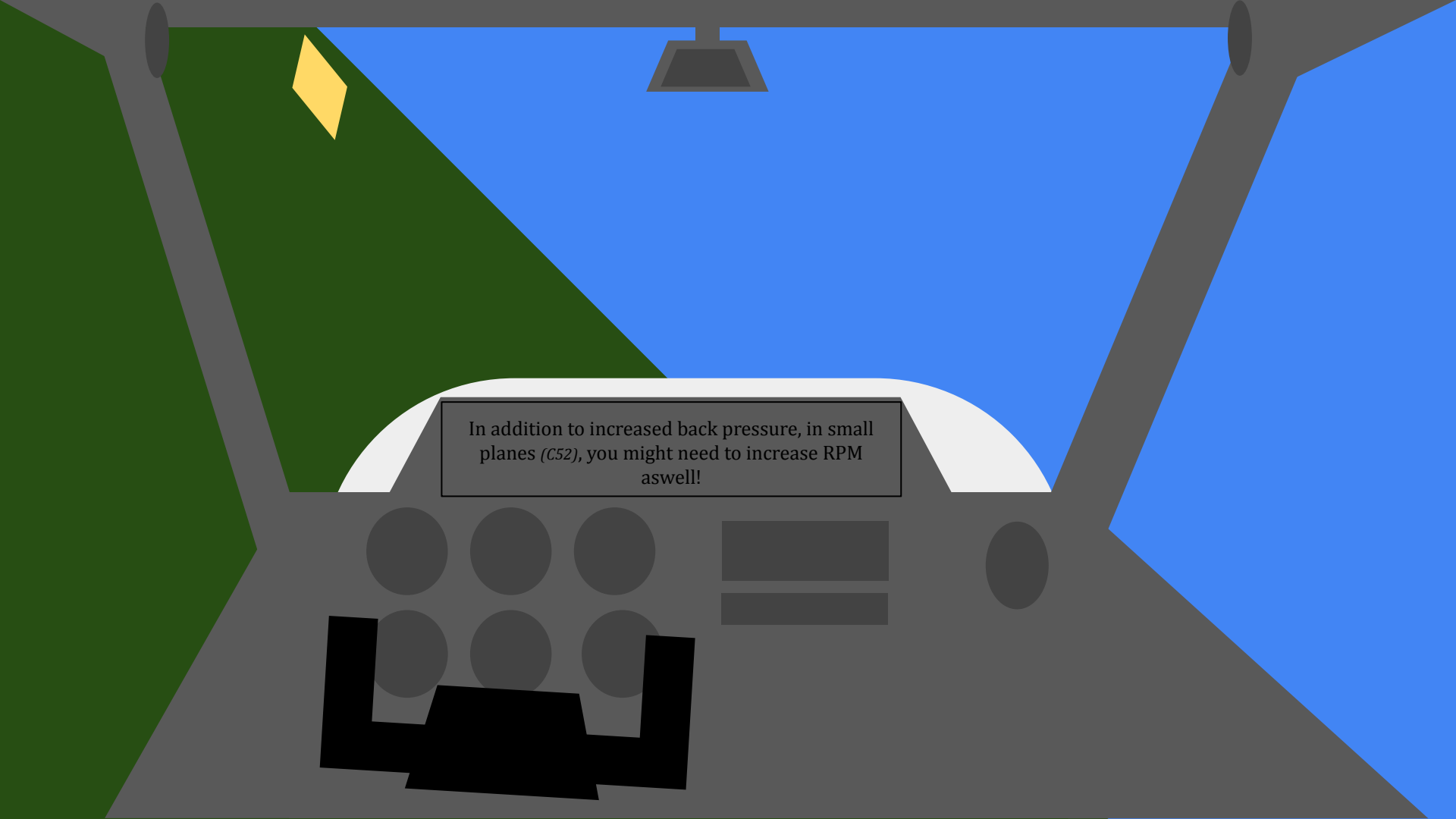
Always set up steep turns with a visual reference.
Evaluate your performance by comparing BEFORE vs AFTER:
Heading, Altitude, Airspeed. *(think H.A.A)*

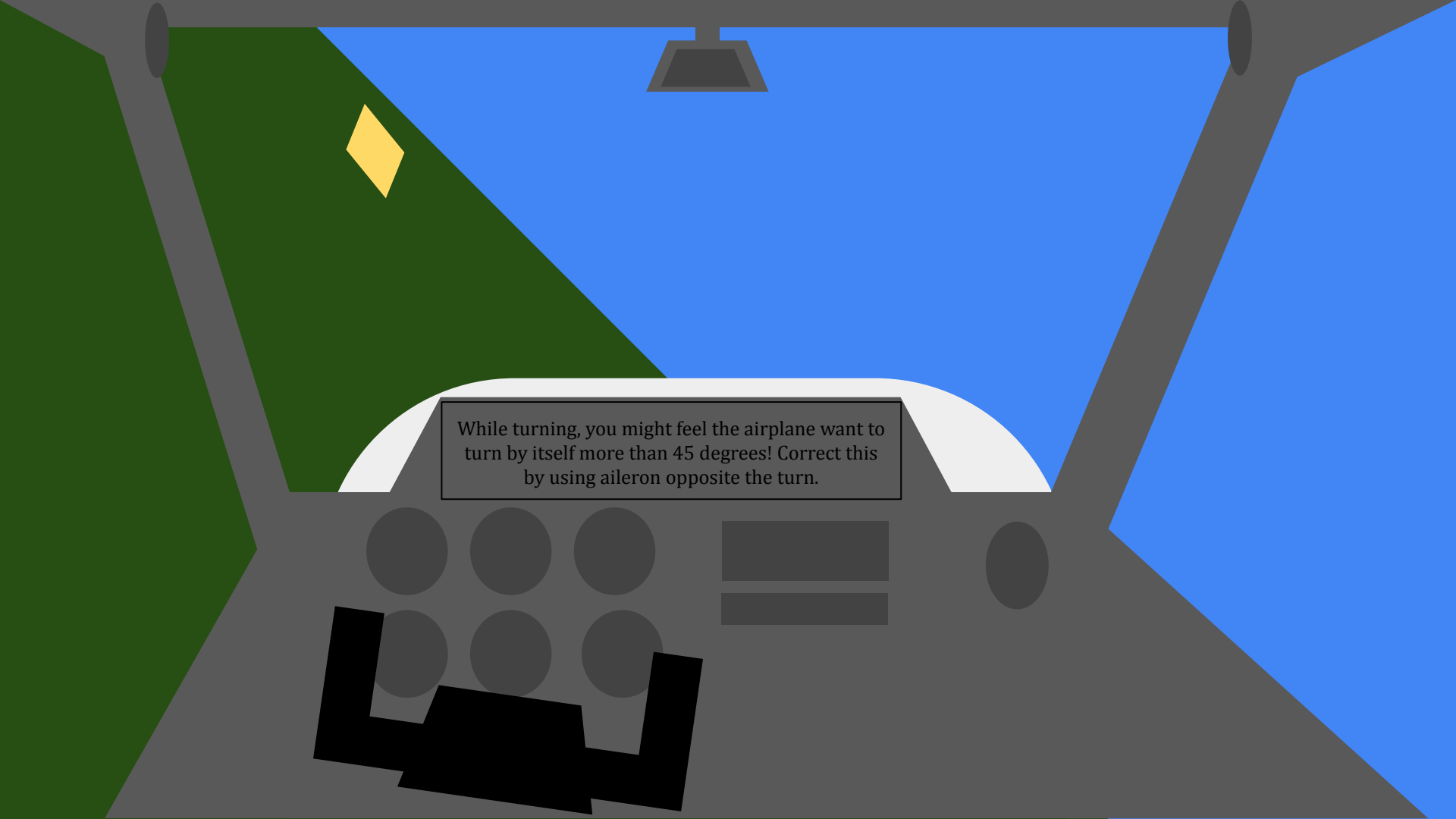

Lets use this Mountain as our visual reference.
We will start by rolling into a 45 degree bank to the left. We will make a full 360 turn.

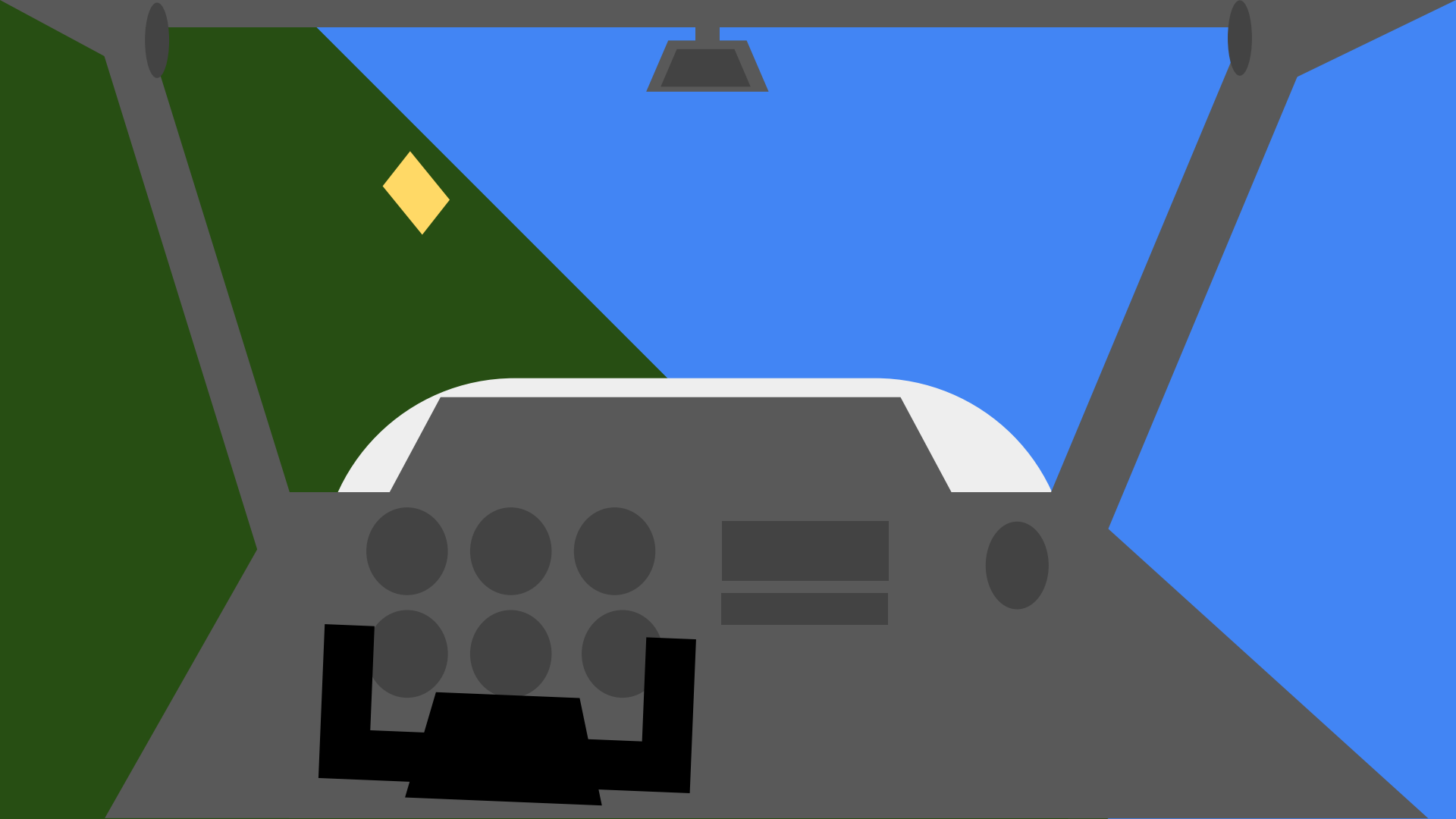


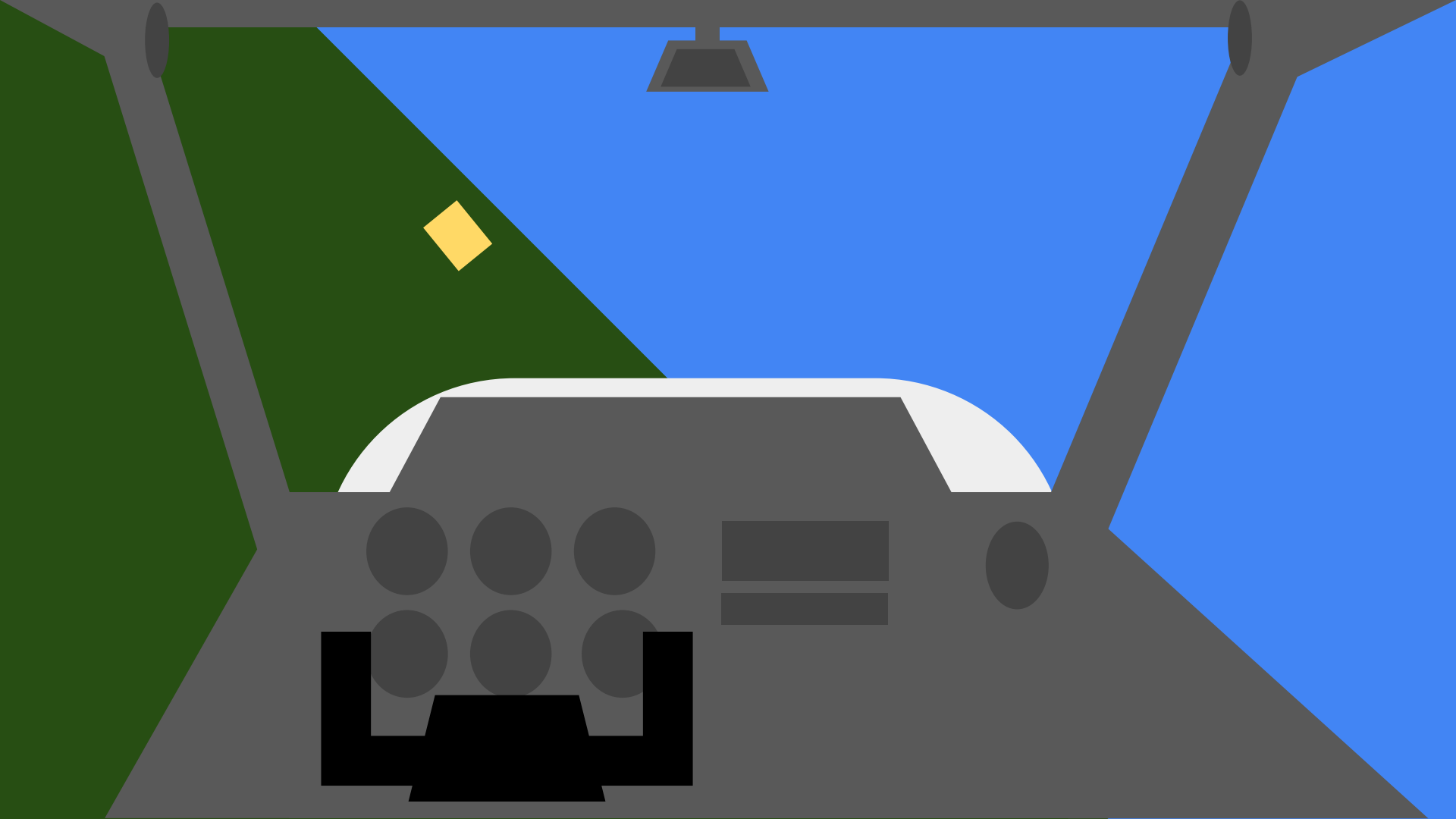
We are now at 45 degrees of bank.
Now we can neutralize ailerons.
We will also need to increase back pressure for the decrease in the vertical component of lift!

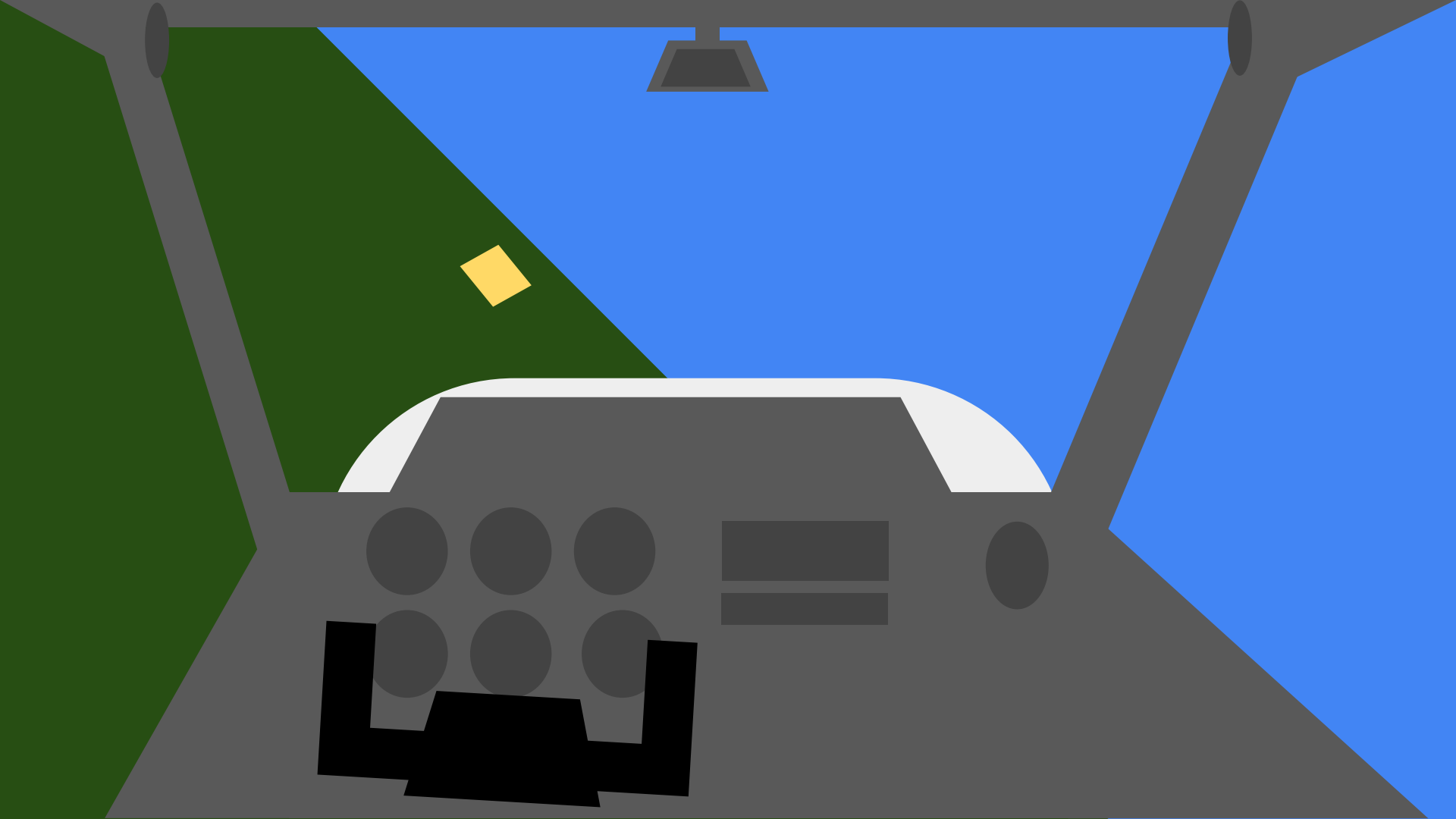


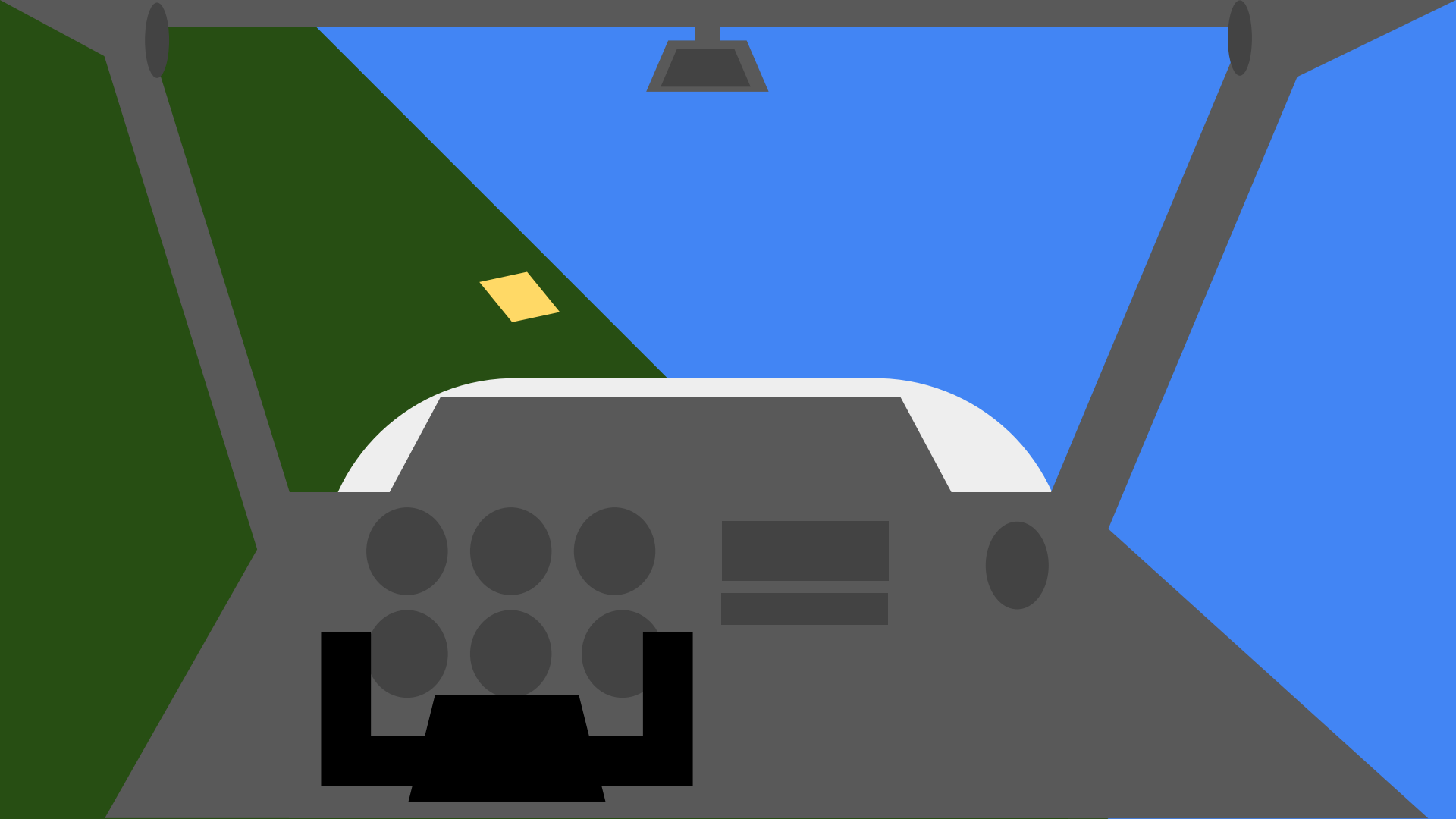

In addition to increased back pressure, in small planes *(C52)*, you might need to increase RPM aswell!

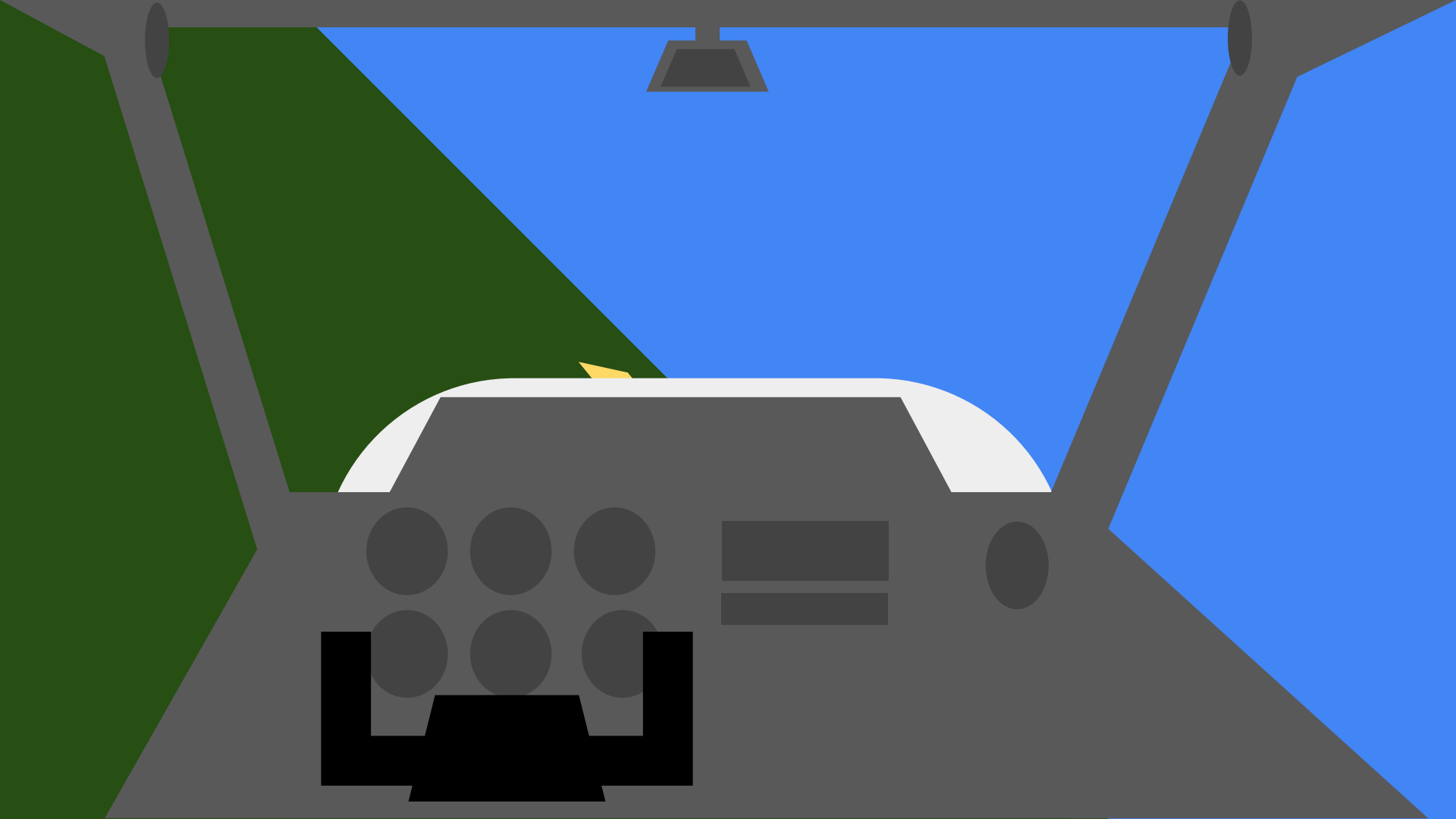

While turning, you might feel the airplane want to turn by itself more than 45 degrees! Correct this by using aileron opposite the turn.

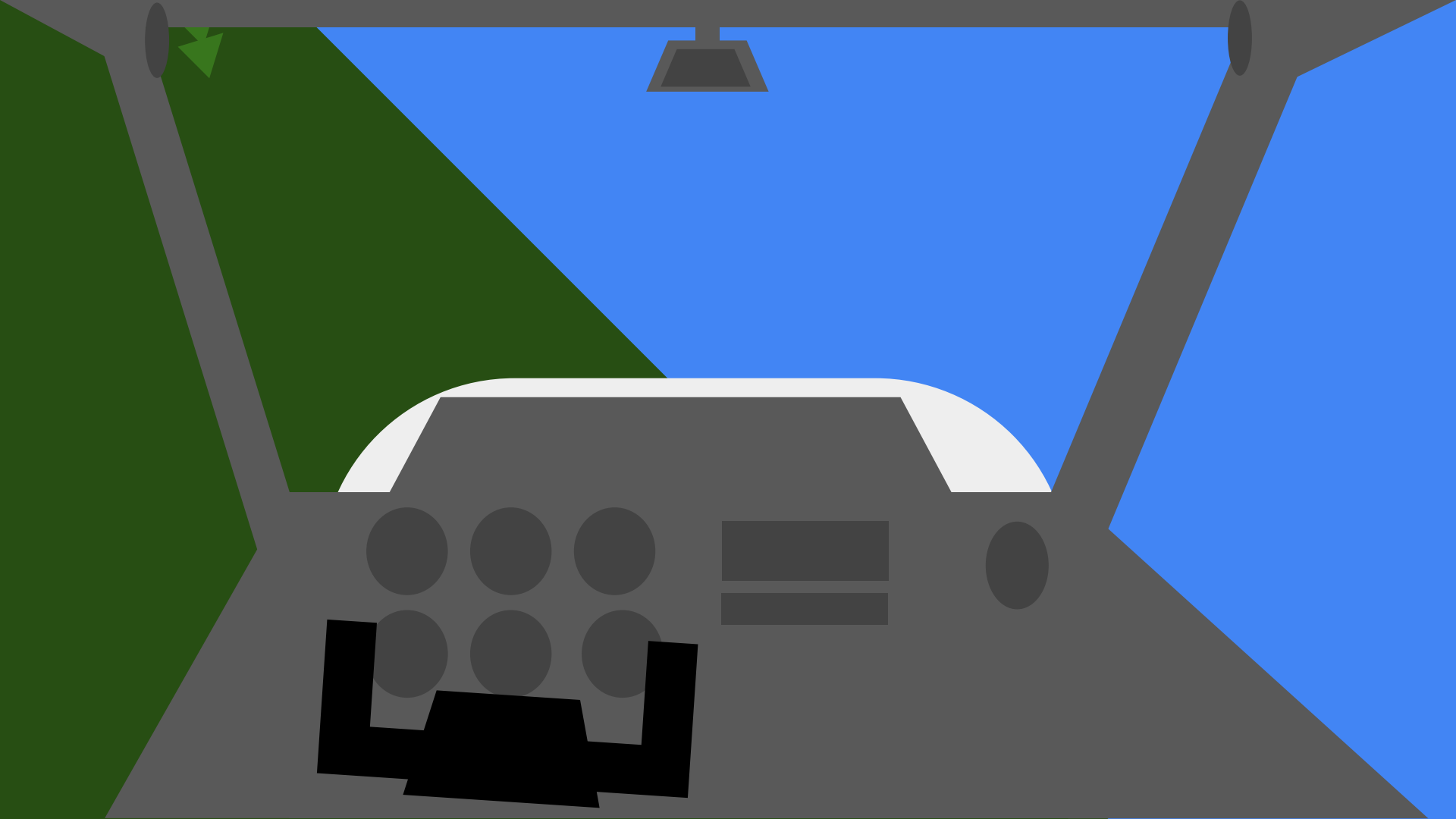


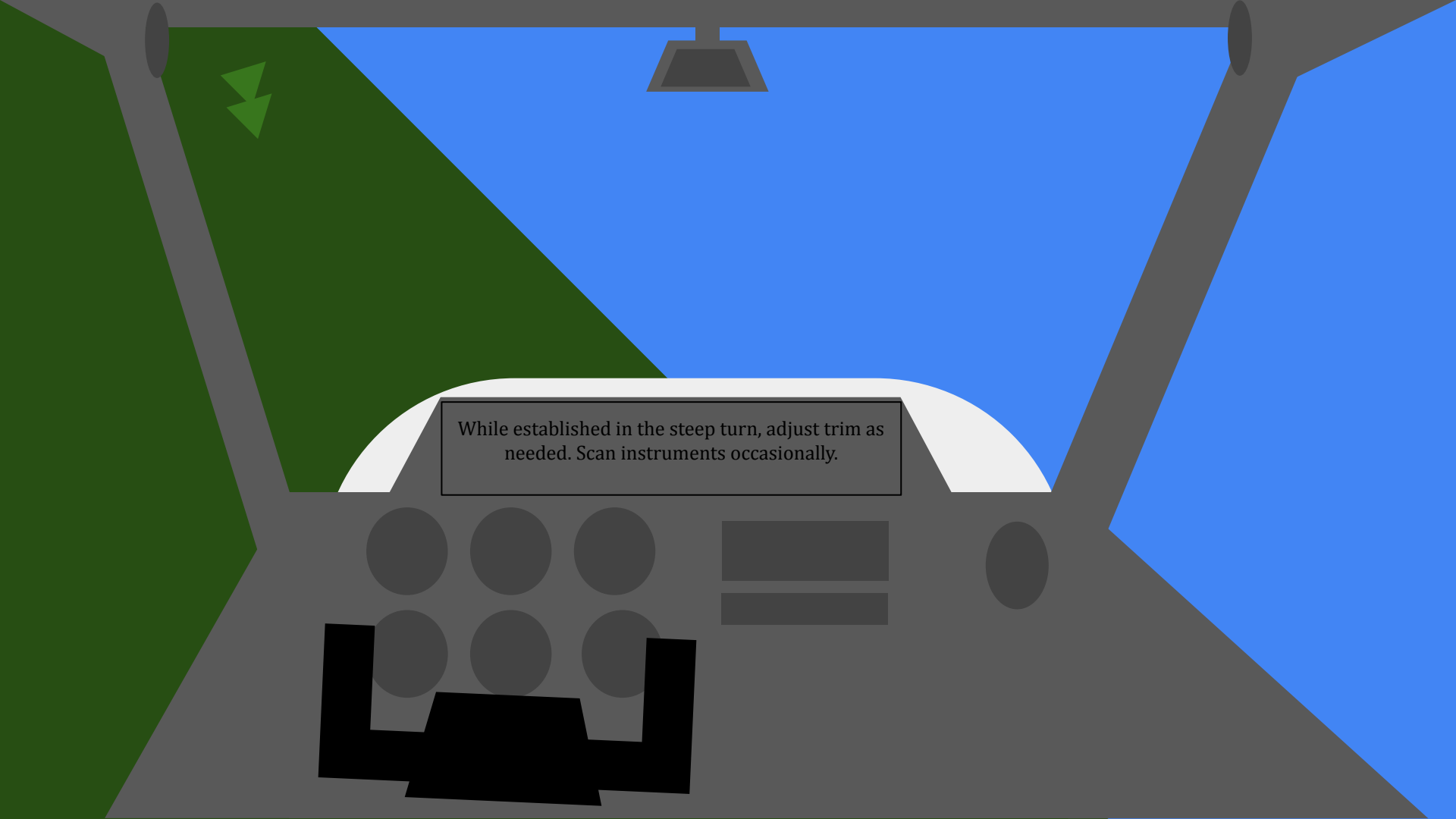


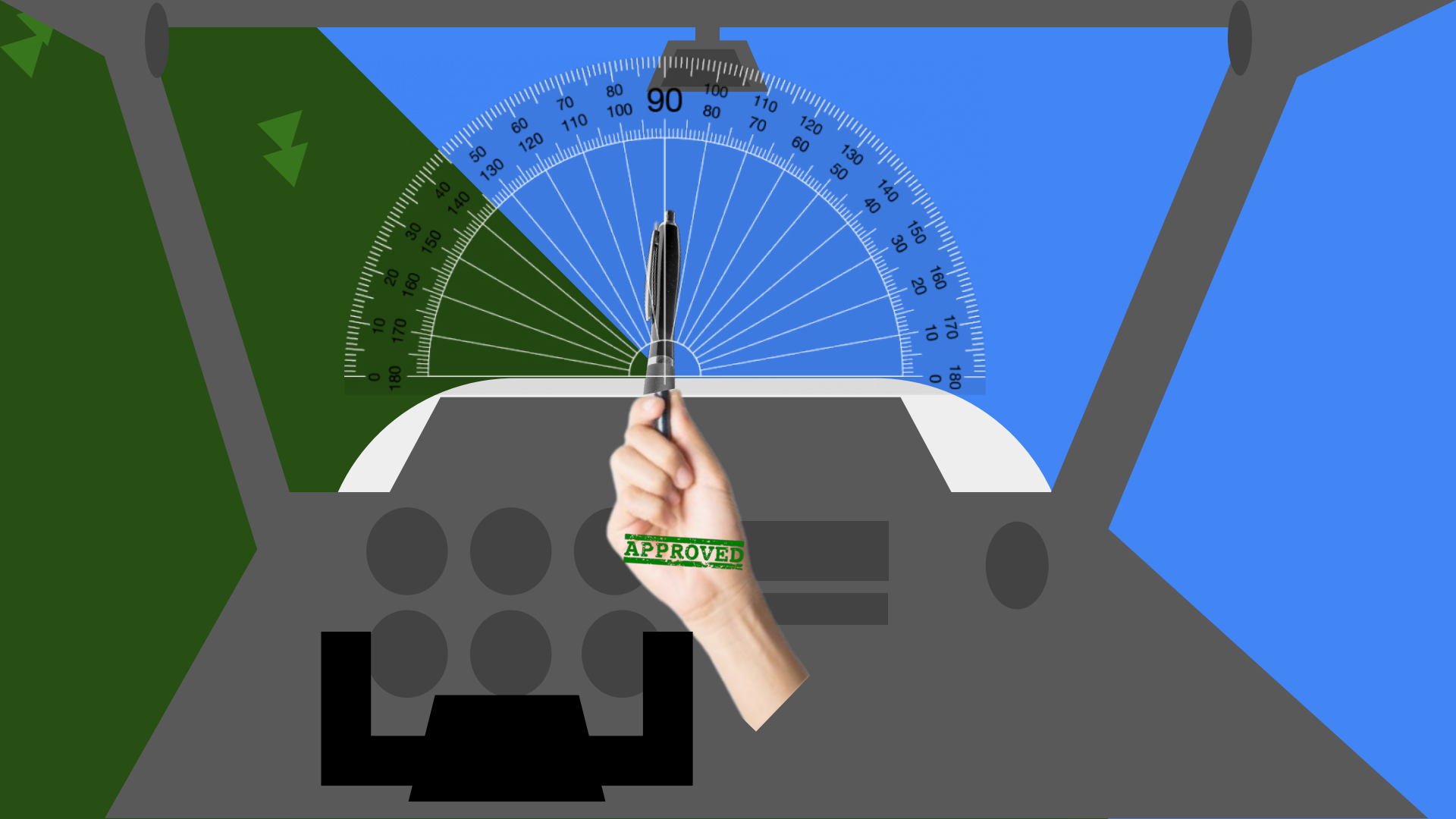


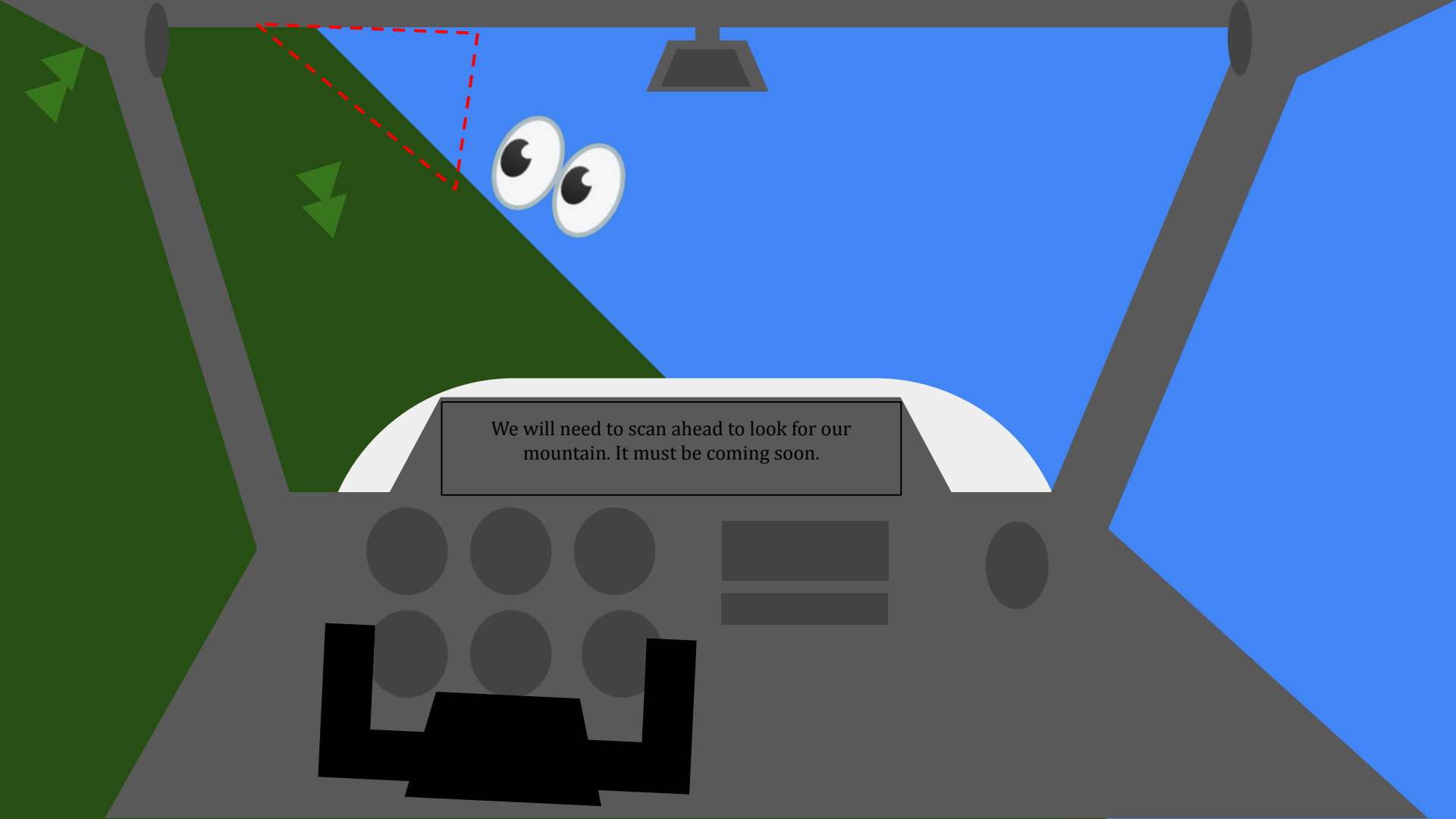


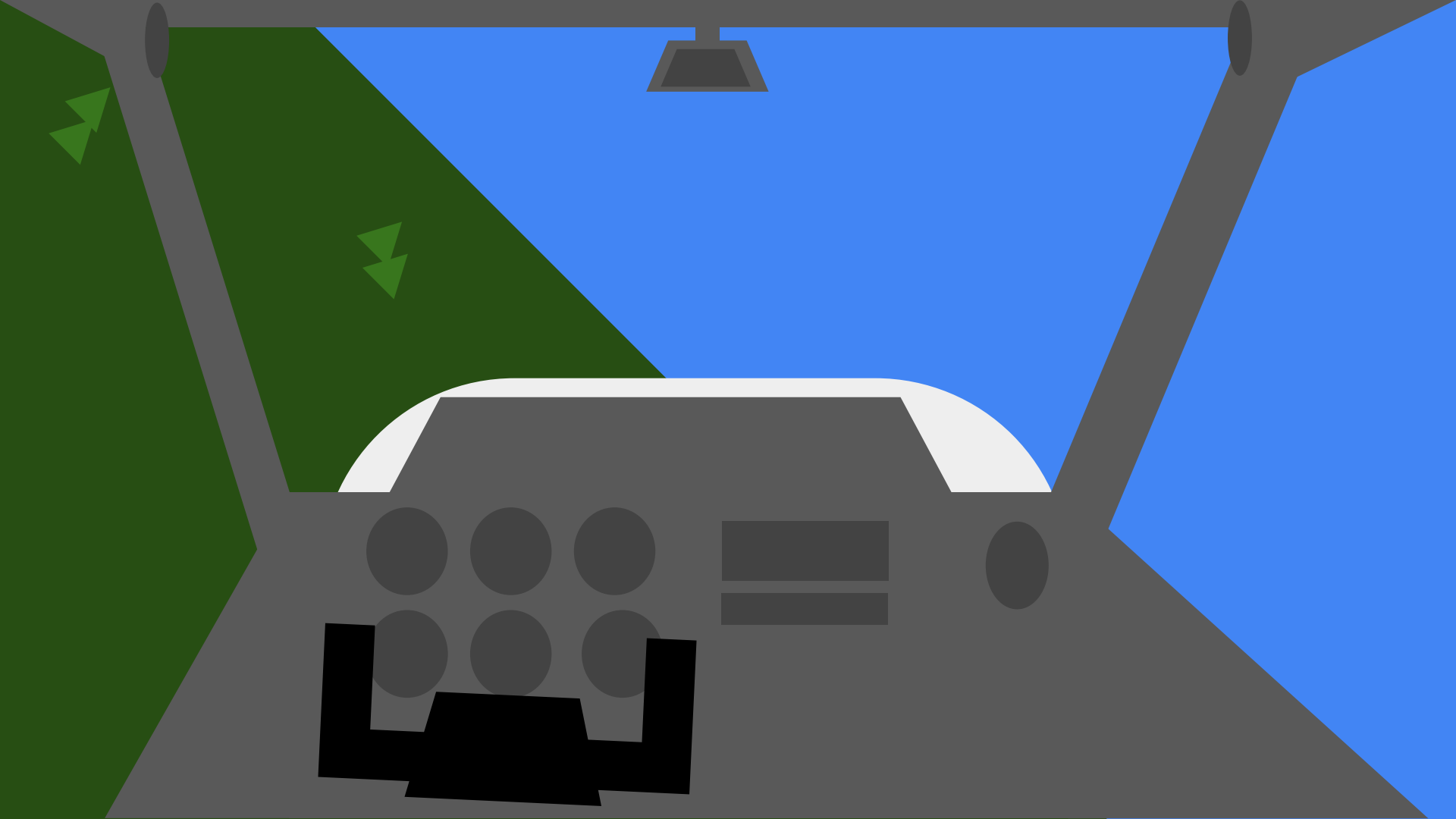


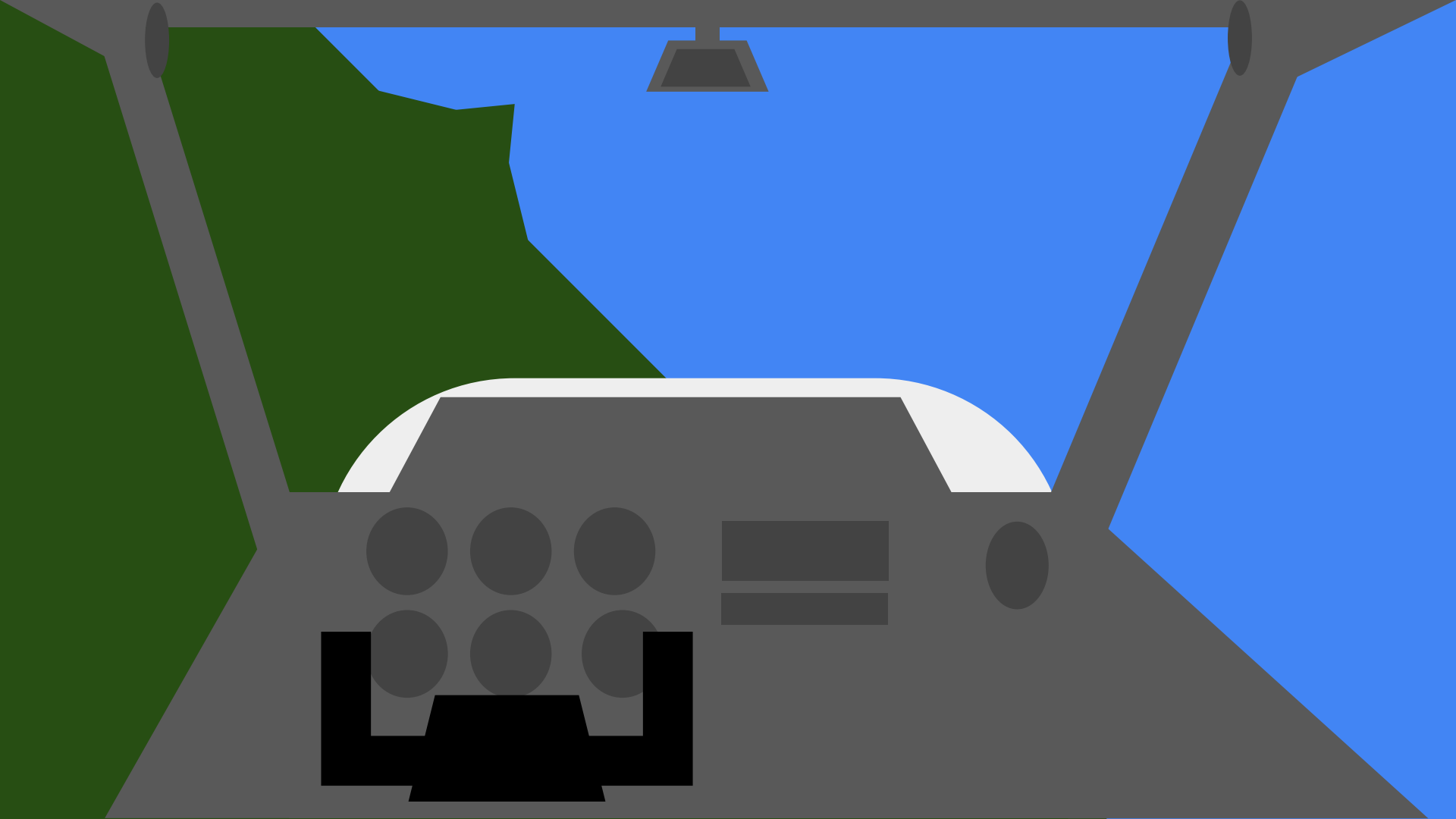


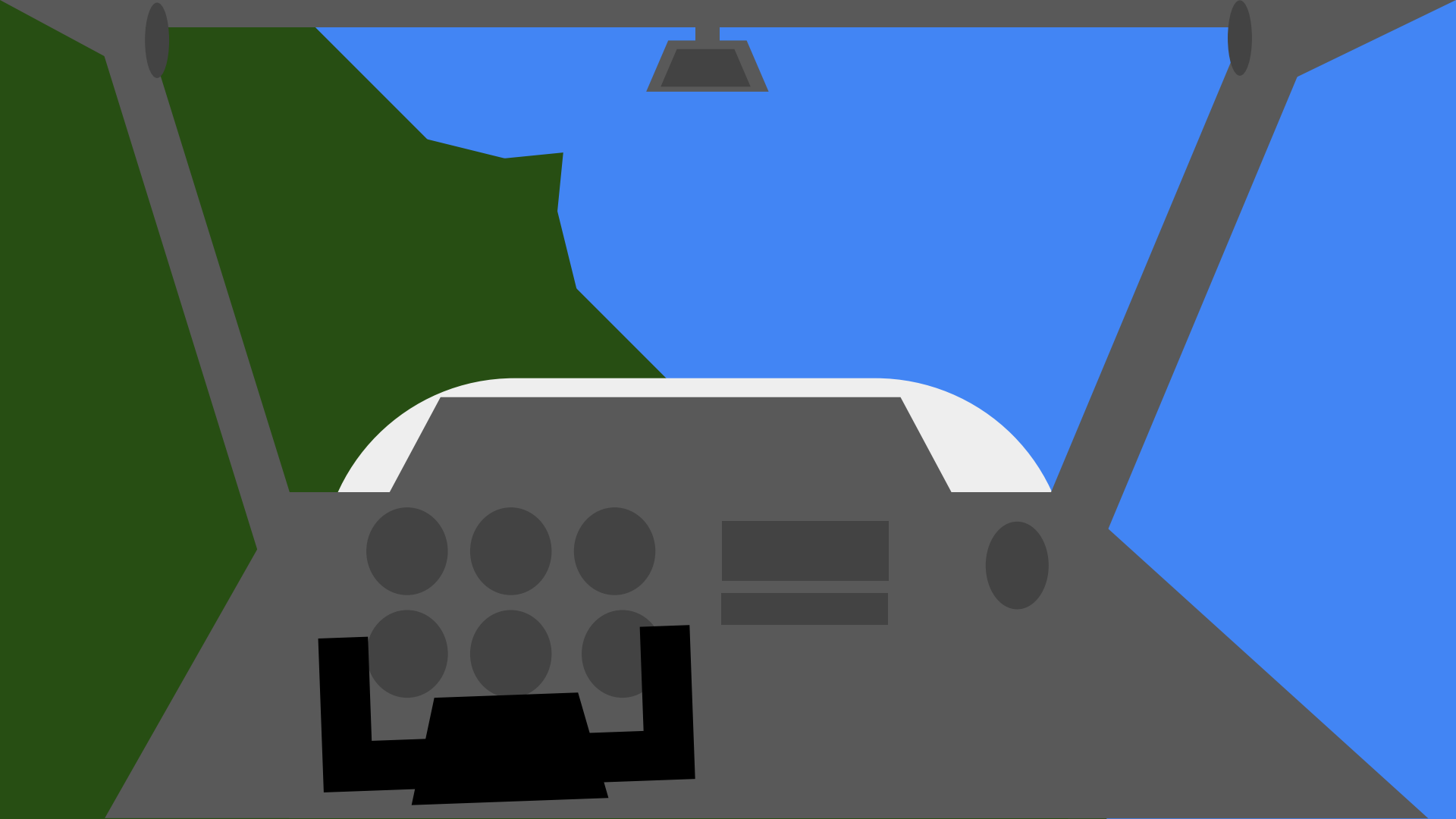

While established in the steep turn, adjust trim as needed. Scan instruments occasionally.

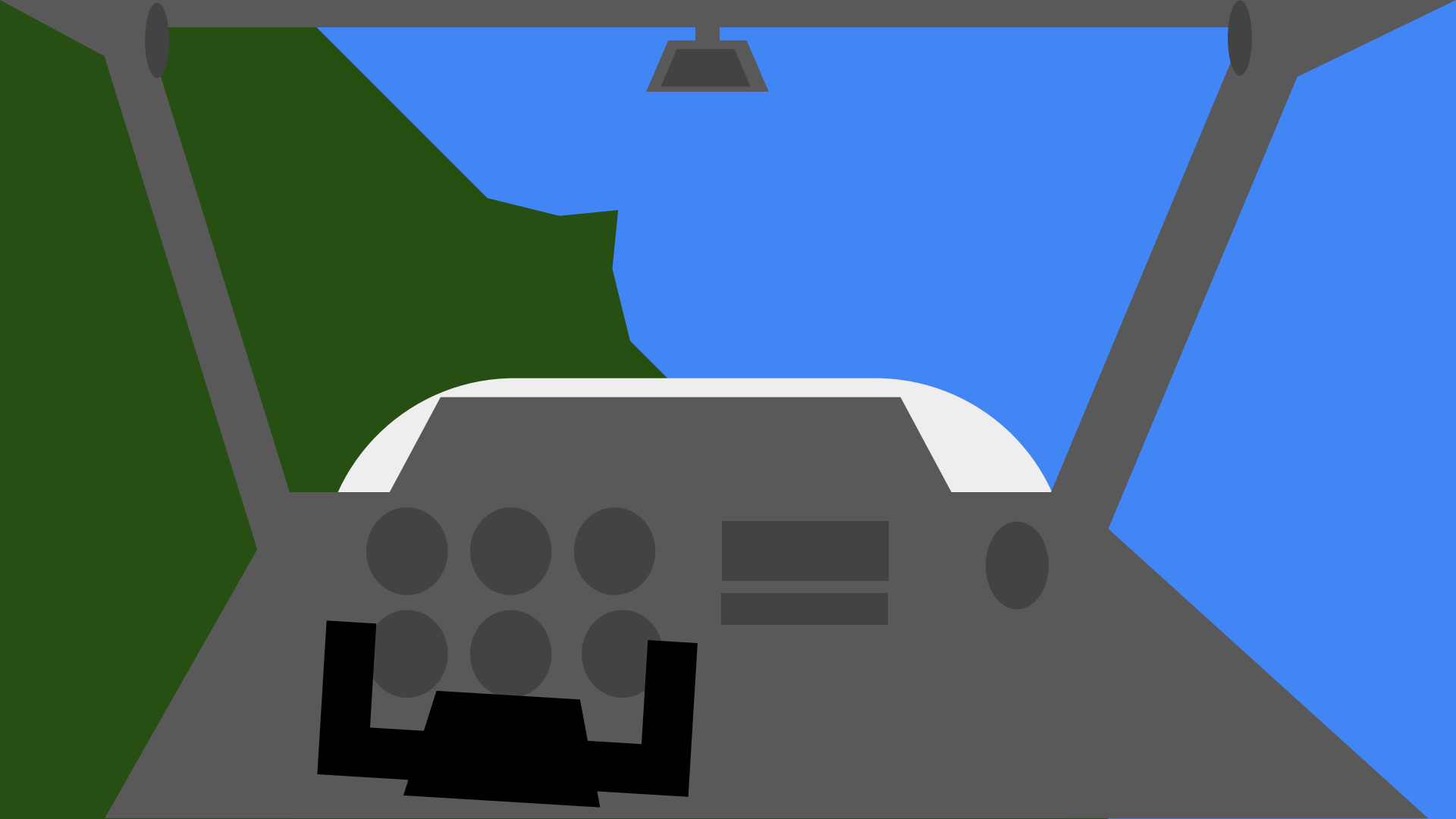

90
APPROVED

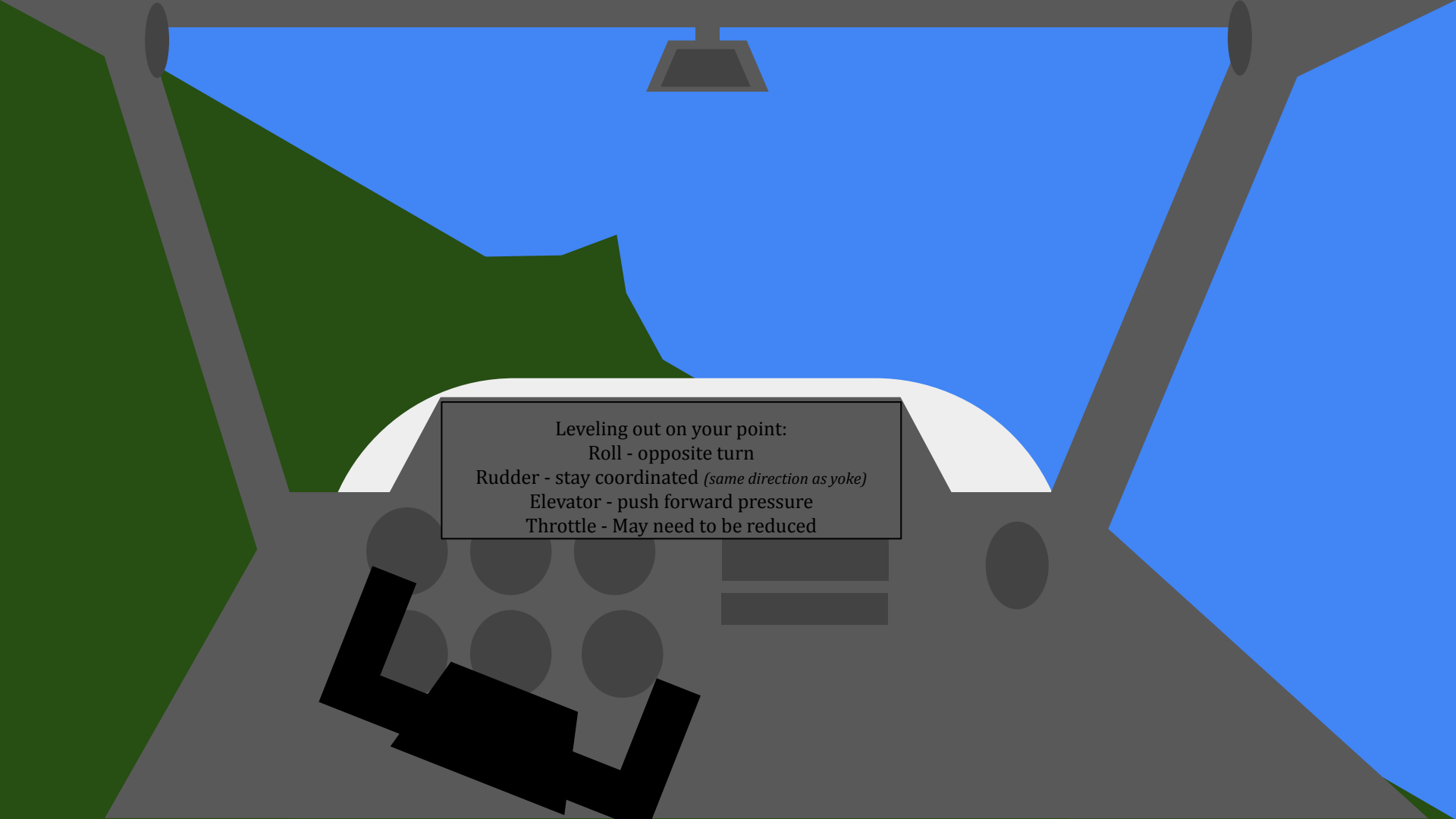

We will need to scan ahead to look for our mountain. It must be coming soon.

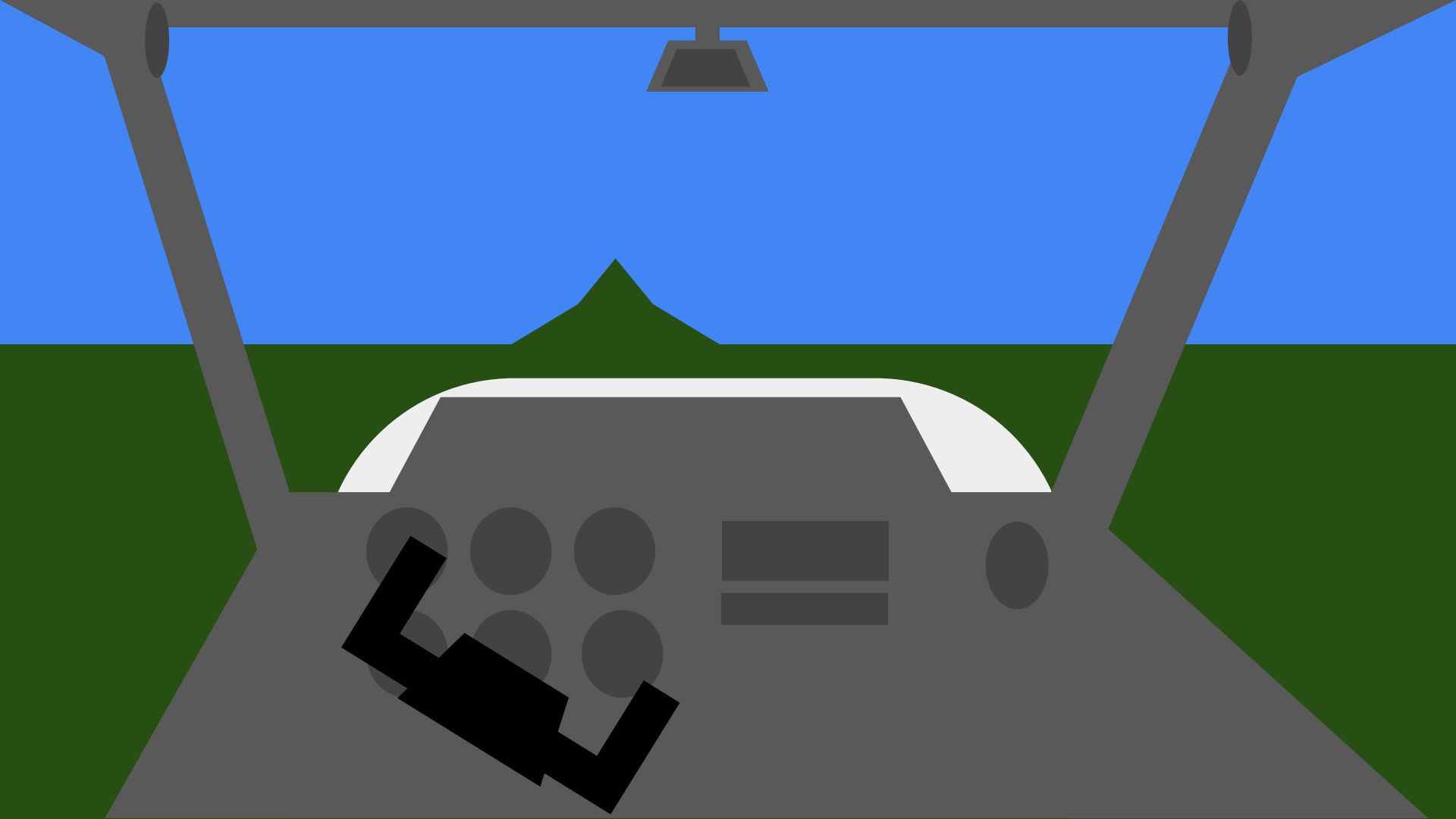


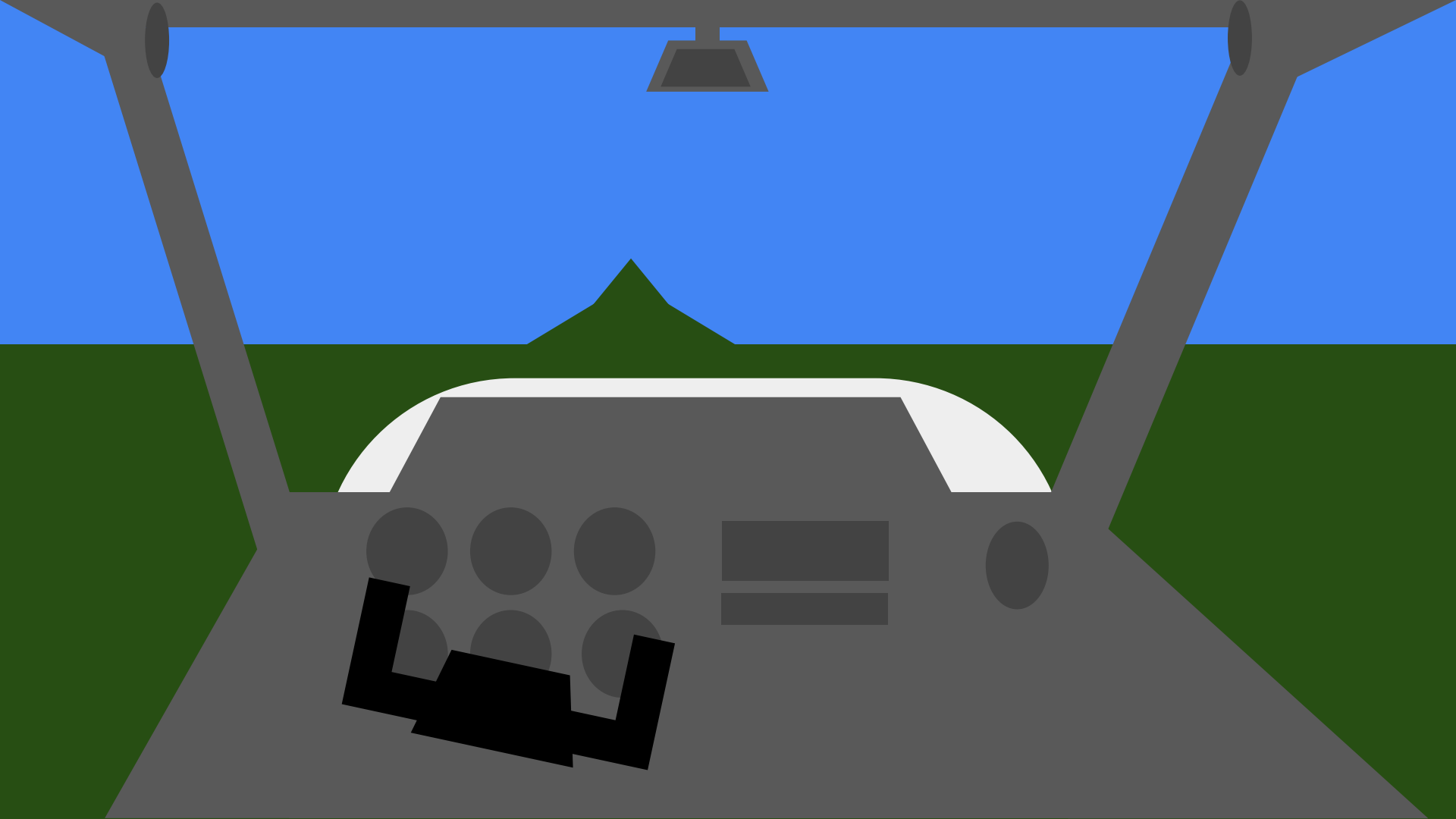


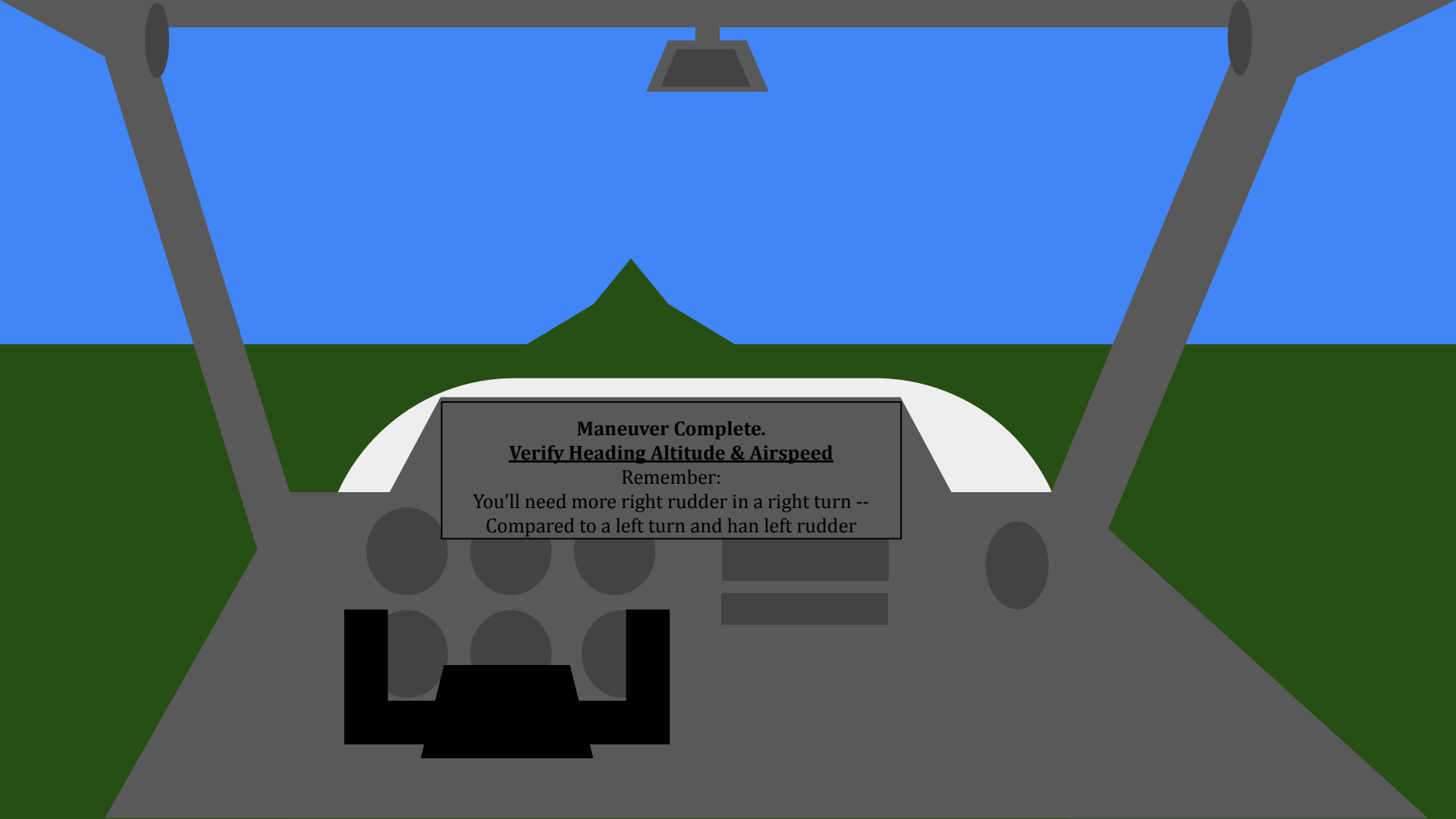





Leveling out on your point:
Roll - opposite turn
Rudder - stay coordinated *(same direction as yoke)*
Elevator - push forward pressure
Throttle - May need to be reduced






Maneuver Complete.
<u>Verify Heading Altitude & Airspeed</u>
Remember:
You'll need more right rudder in a right turn --
Compared to a left turn and han left rudder

To try it hands-on, you can play around with this GitHub Project:

This flight sim. Is not made by me. All credit to the creators!

Web-based flight simulator
https://s-macke.github.io/FSHistory/