

# How to drive fast



Detroit Region SCCA Solo School

Nick Rennell

# Discussion

There are two drivers, Driver A and Driver B. Both are driving the same type of car. Both are driving on the same autocross course. Driver A posts a faster run time than Driver B.

Why?

# Agenda

- Car Control

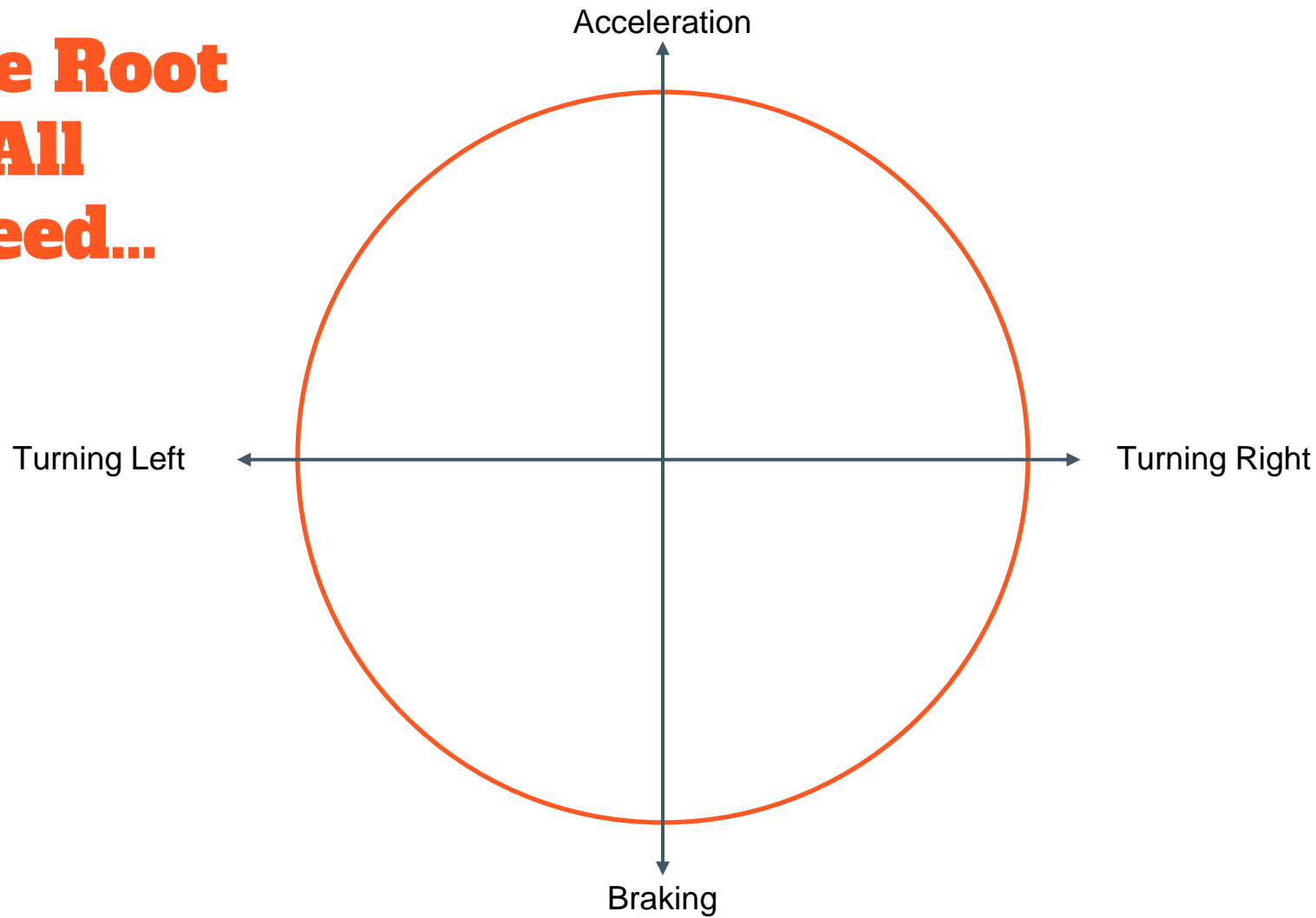
- Friction Circle
  - Accelerating
  - Steering
  - Braking
- Weight Transfer

- Driving Line

- The Driving Line
- Course elements
- Vision
- Mental game

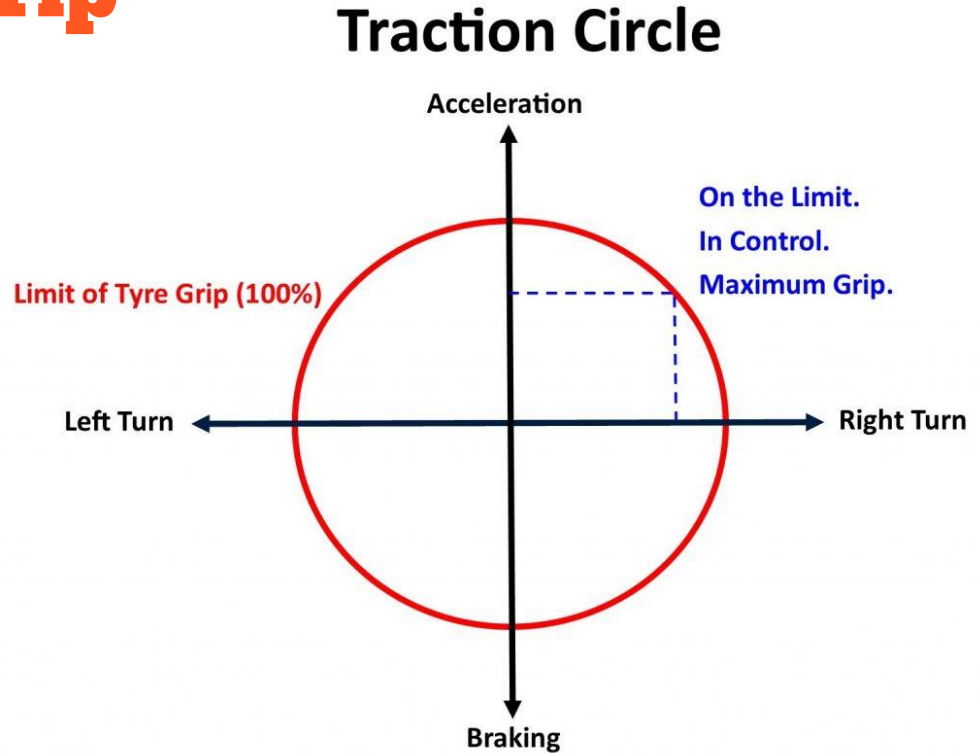
# Car Control

# The Root of All Speed...



# Finite Amount of Grip

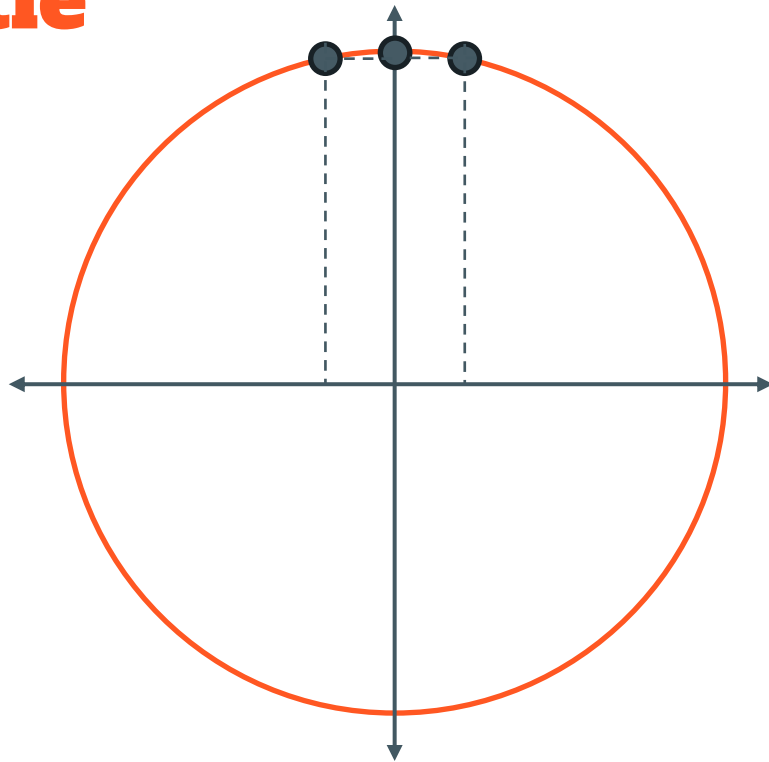
- All acceleration needs grip
- Overdriving



# Accelerating and Throttle

## – Beginner

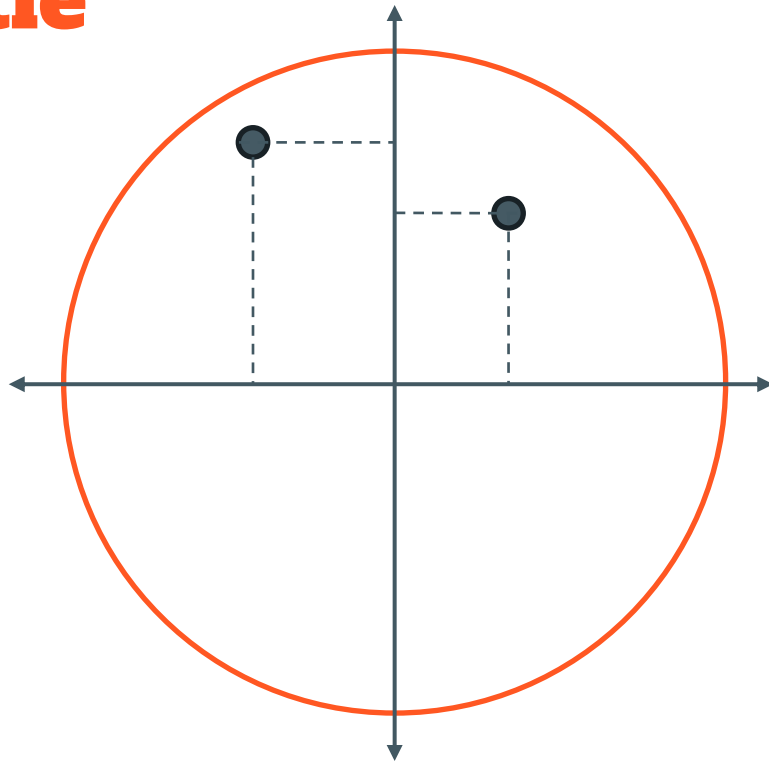
- Identify linear acceleration zones where the you can go WOT and lift/coast briefly before braking zones.
- Focus on smooth throttle application and minimizing wheel spin



# Accelerating and Throttle

## – Intermediate

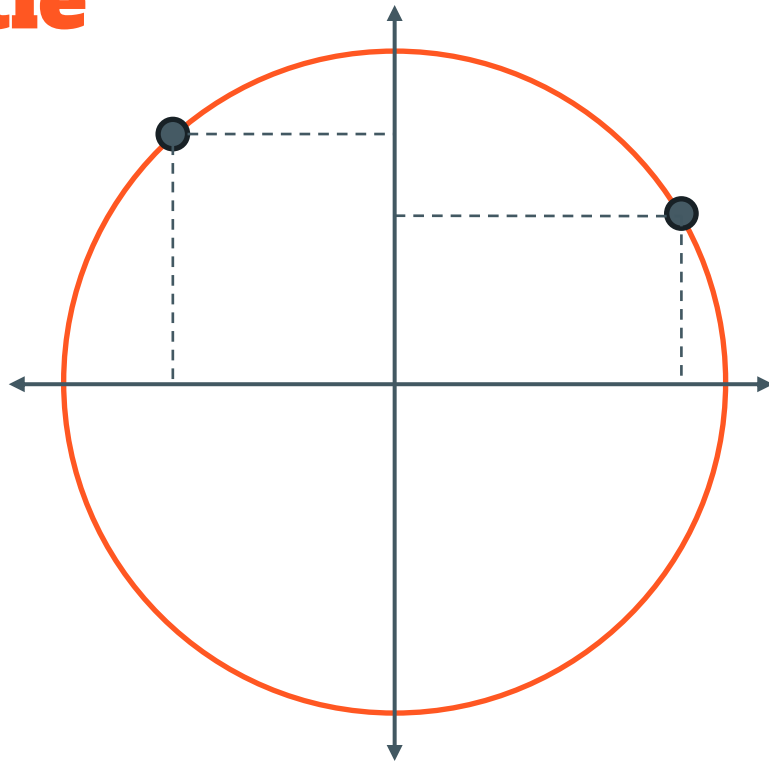
- Identify corner exit blending zones where partial throttle can be applied earlier
- Work on reducing transition time from accelerator to brakes



# Accelerating and Throttle

## – Advanced

- Begin pushing the limits of how long throttle can be applied on straights
- Work on seamless transition from Accelerator to brakes (Left foot braking)
- Using more throttle on corner exit to help vehicle rotate within tire limits and maximize speed



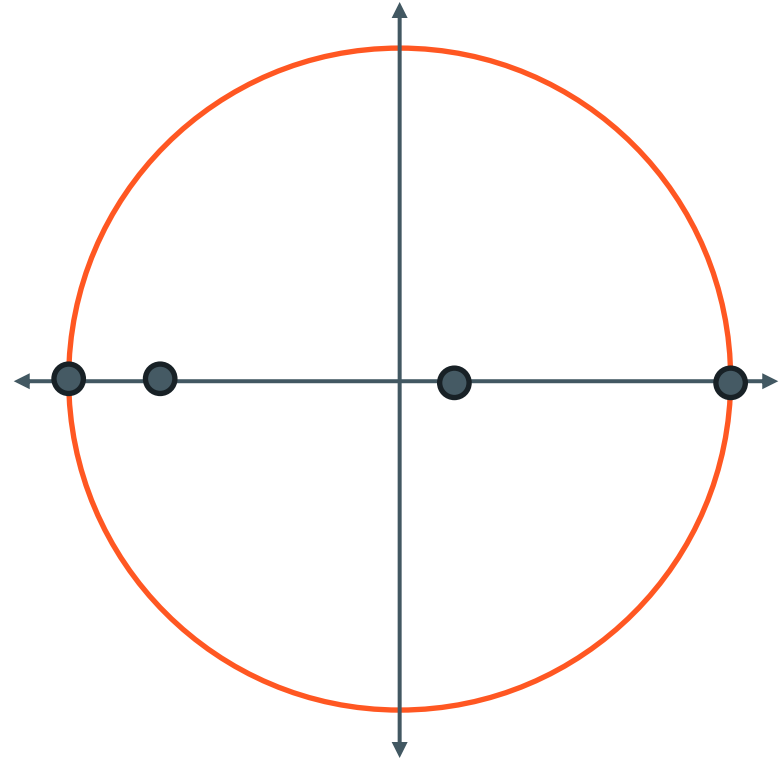
# A Note on Traction Control

- Great tool if a car is new to you
- Will hurt your progress as a driver if you use it all the time
- Doesn't allow you to learn throttle control
- Rain is a different story



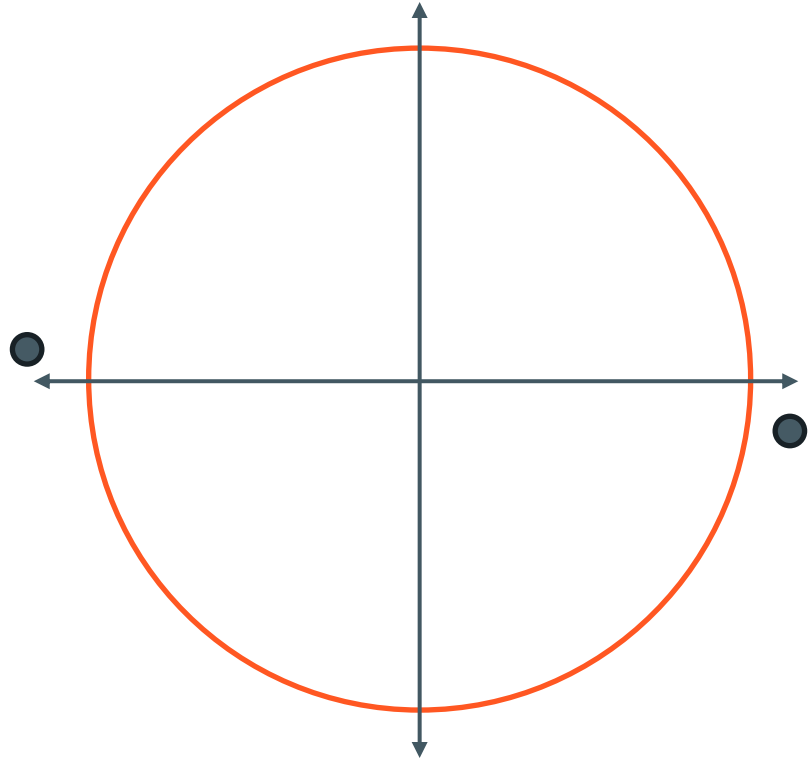
# Steering

- If you're not at the limit of adhesion in the corner, you're losing time



# Steering

- What happens when you exceed lateral grip



# Understeer is when...

The front axle loses grip during a turn.

The car “under-rotates.”



# Understeer

Understeer – the front end of the car begins to “push” in the corner.

- **Cause:** The driver is carrying too much speed into the corner or is applying too much steering wheel angle/steered too quickly for the turn.
- **Reaction:** To stop understeer the driver should lift off the accelerator pedal/lightly apply the brake while reducing the steering wheel angle until front grip has returned.
  - Most beginners will react to understeer with MORE steering wheel angle which will only cause the car to understeer more and damage the tires.
- **Fix:** Carry less speed into/out of the corner or “Blend” the brakes into the turn in (trail braking). Slow down steering inputs.



# Example of understeer



**Are there other ways to exceed lateral grip?**

# Oversteer is when...

The rear axle loses grip during a turn.

The car “over-rotates.”



# Oversteer

Corner Entry Oversteer – the rear end of the car begins to slide or rotate on Corner Entry.

- **Cause:** The driver has carried the brakes too long/hard into the corner entry or has lifted off the accelerator pedal too rapidly while turning (lift off oversteer).
- **Reaction:** Counter steer to avoid spinning and reapply partial throttle to shift grip to the rear tires.
- **Fix:** Brake earlier before corner entry and apply more steering wheel angle on turn in.

# Oversteer

Corner Exit Oversteer - the rear end of the car begins to slide or rotate on Corner Exit

- **Cause:** The driver has applied too much throttle too quickly.
- **Reaction:** Counter steer to avoid spinning and partially lift throttle until rear grip is regained.
- **Fix:** Apply throttle later during corner exit/blend in the throttle application.

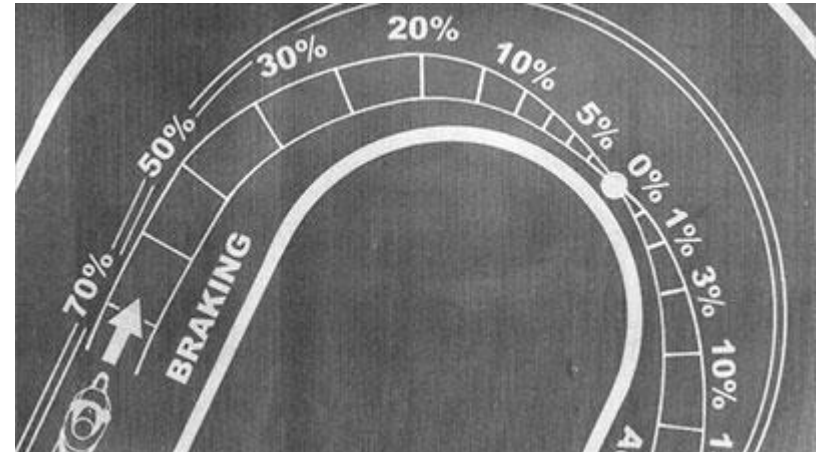
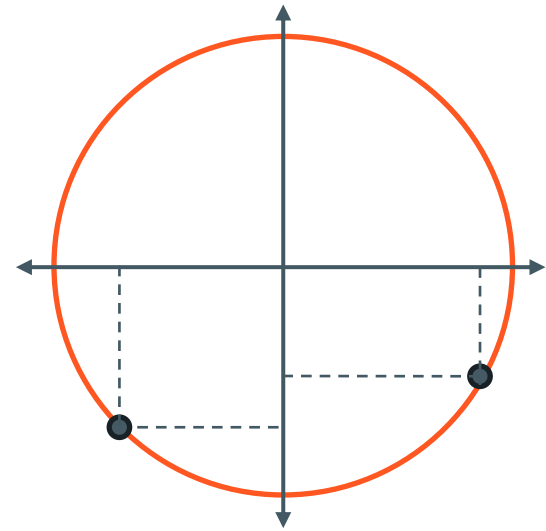


# Example of Oversteer



# Braking

- Trail braking
  - The most comfortable way of braking is to get it all done before you turn in for the corner.
  - Once peak braking is done and grip is available at the tires, you don't have to just use it for steering.
- Left foot braking
  - Helps shorten time between getting off the gas and getting on the brakes.



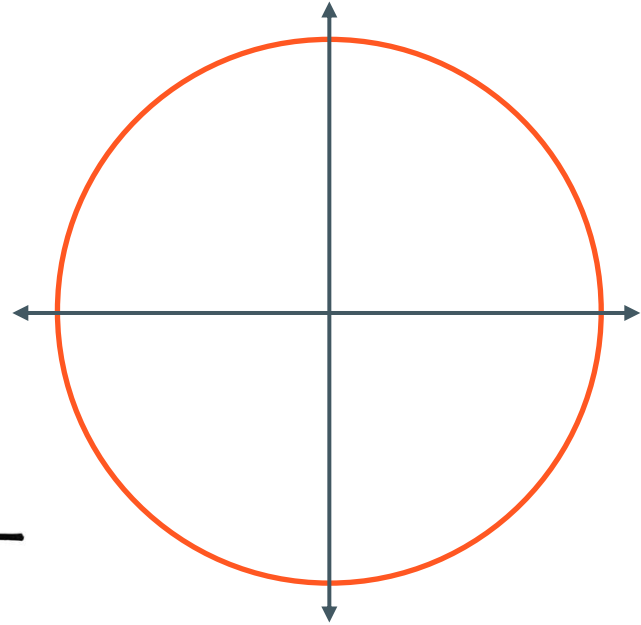
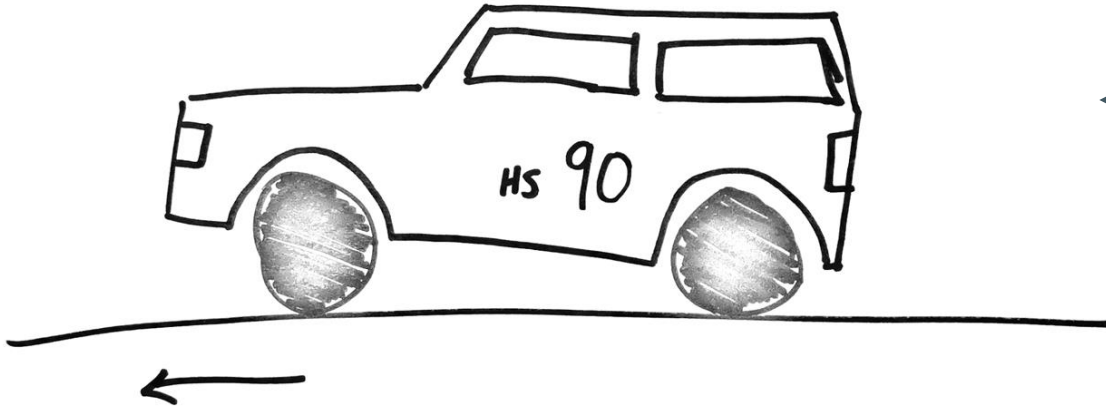
# Hand and Seating Position

- 9 and 3
- Hook thumbs around steering wheel
- Elbows bent
- Full steering rotation in this position
- Take time to adjust seat and steering wheel to your liking

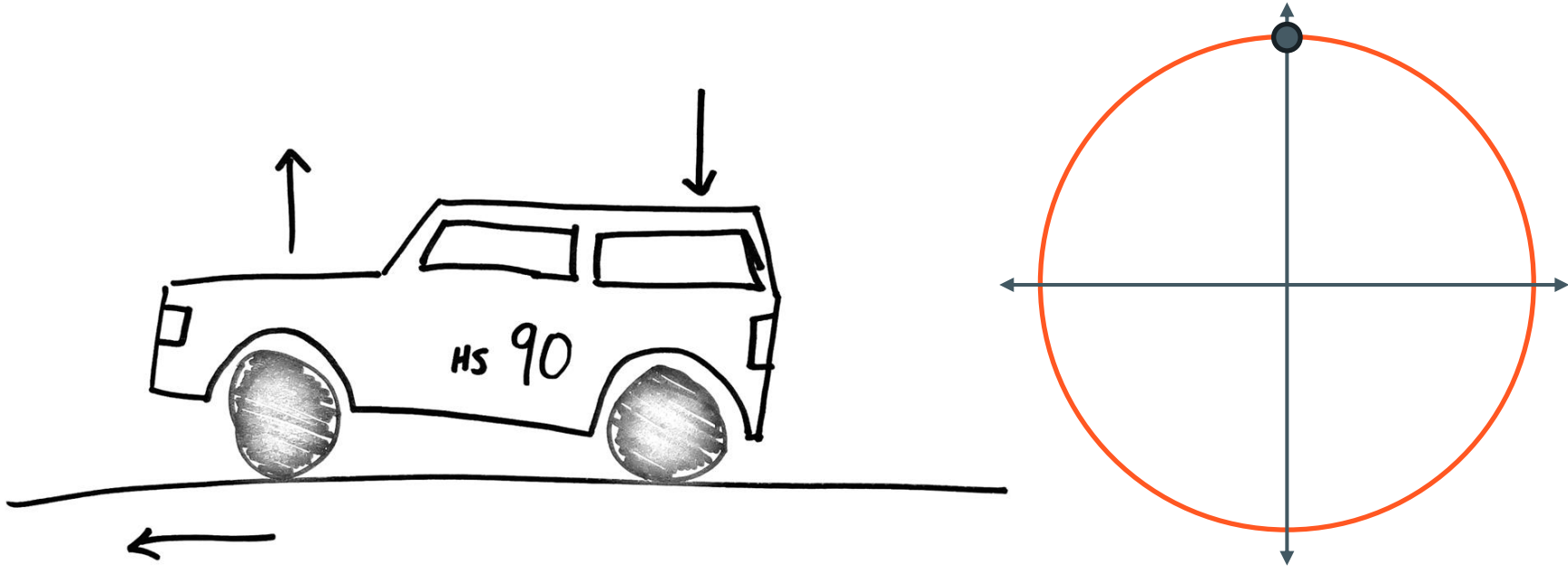


# Weight Transfer

# What happens when you accelerate?

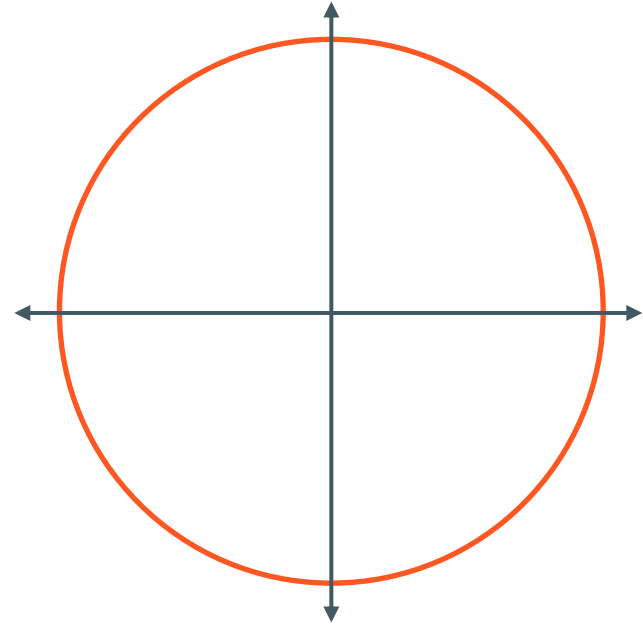
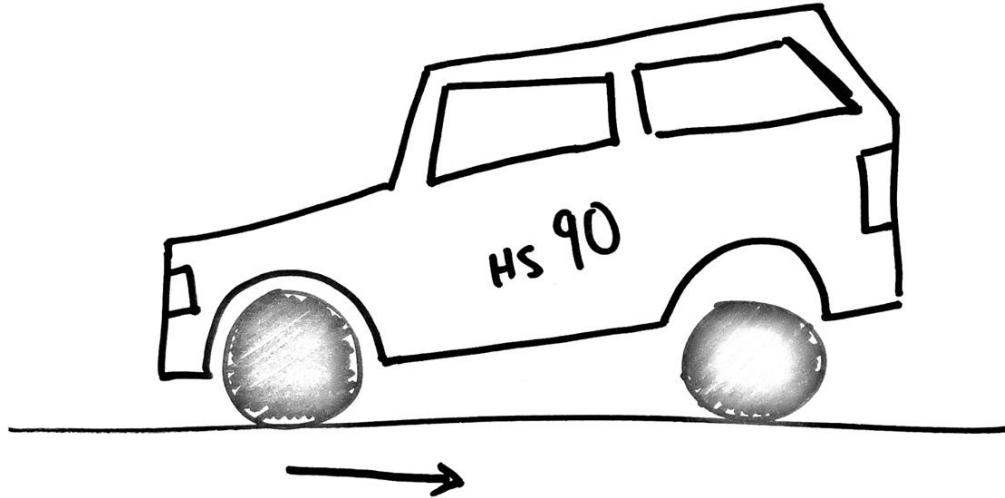


# What happens when you accelerate?

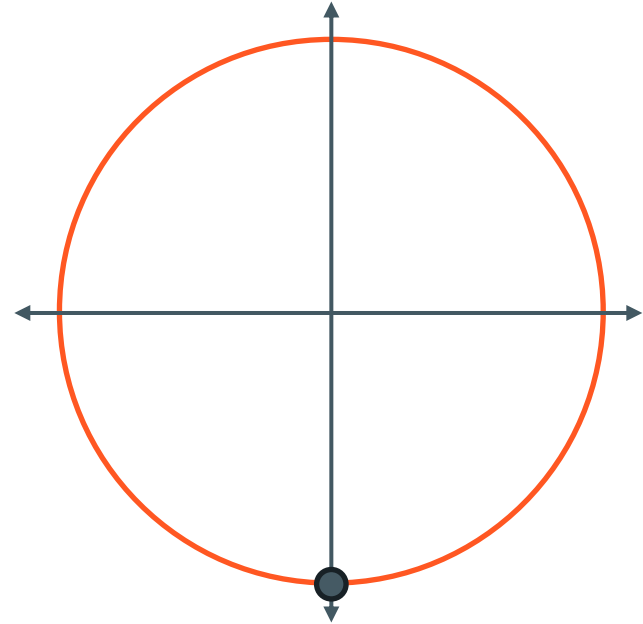
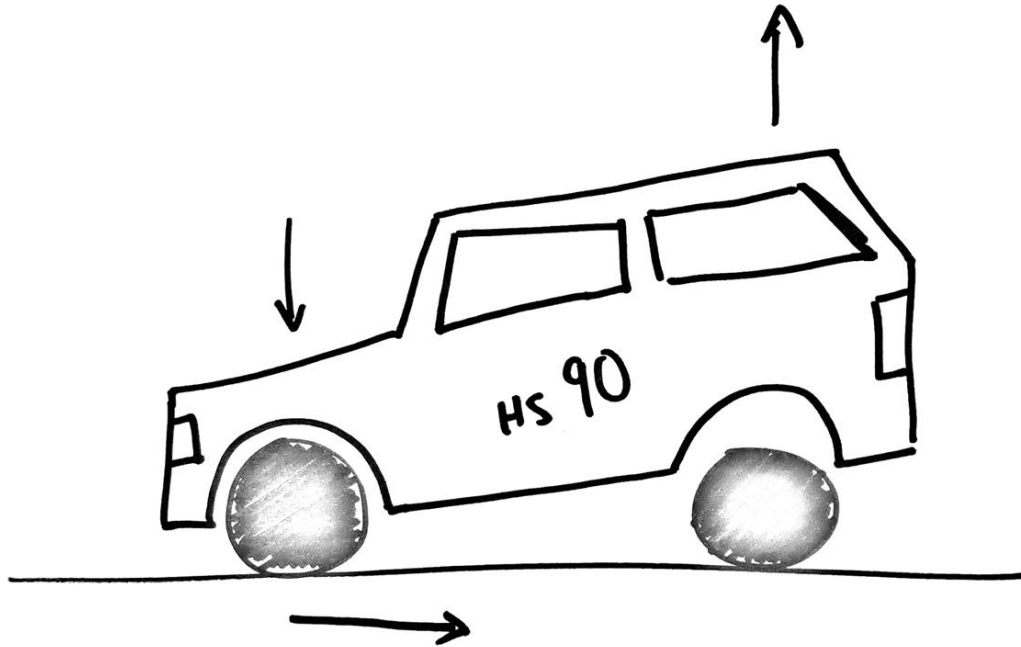


Weight shifts towards the back of the car.

# What happens when you brake?

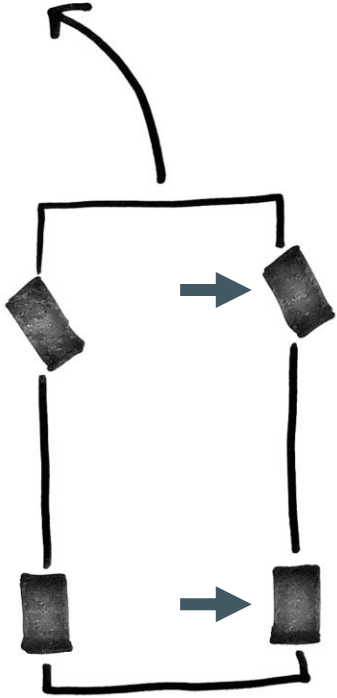


# What happens when you brake?

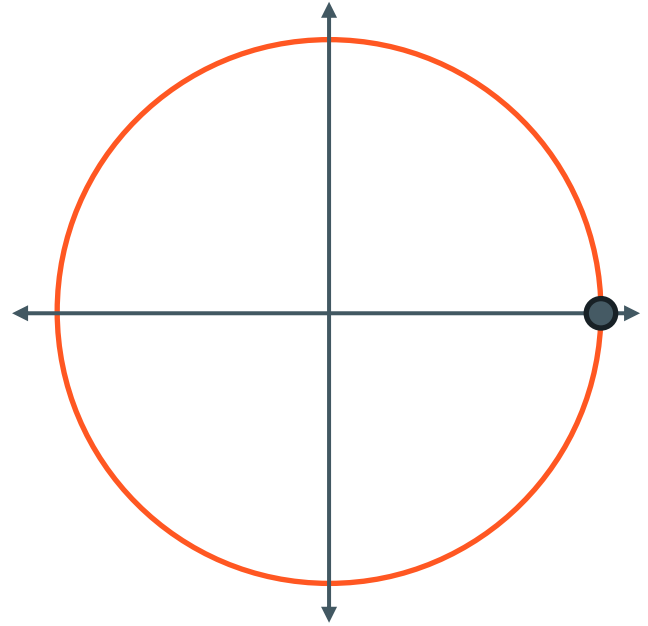


Weight shifts towards the front of the car.

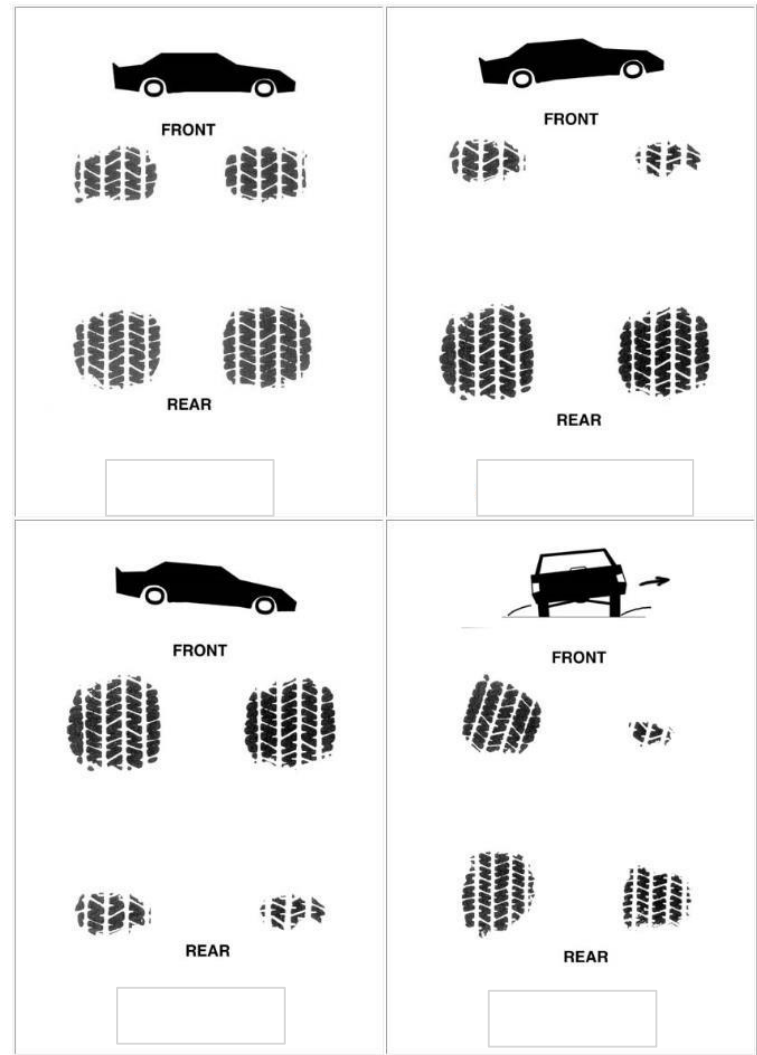
# What happens when you turn?



Weight shifts towards the  
outside of the car.

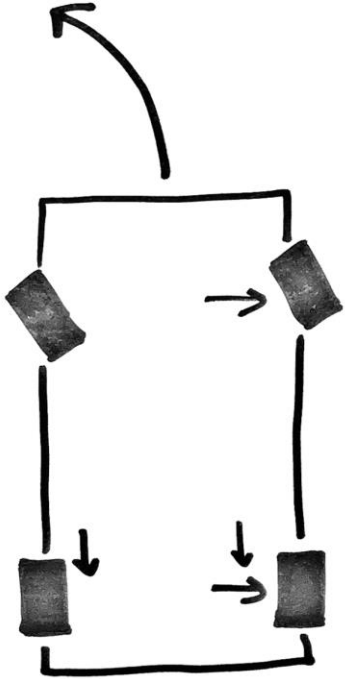


# Contact Patch and the friction circle

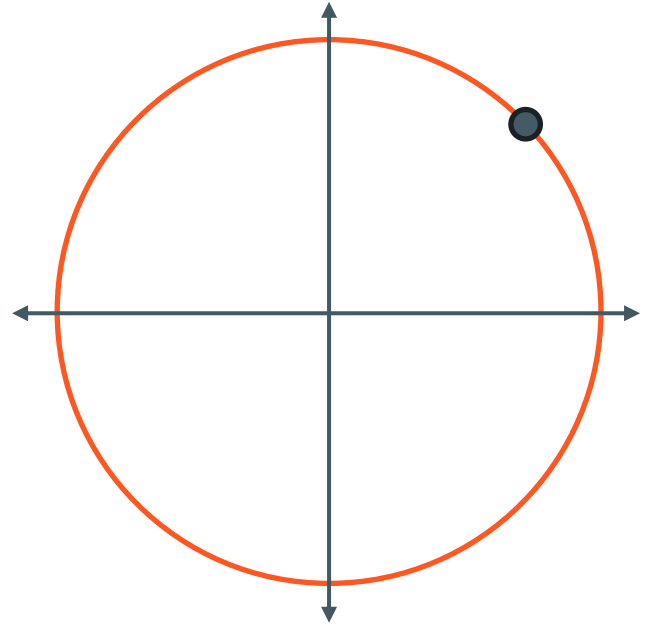


**What happens when you accelerate and turn at the same time?**

# What happens when you accelerate and turn at the same time?

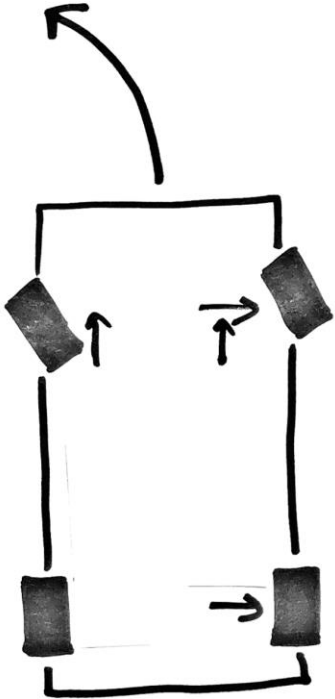


Weight shifts towards the outside of the car and towards the rear of the car.

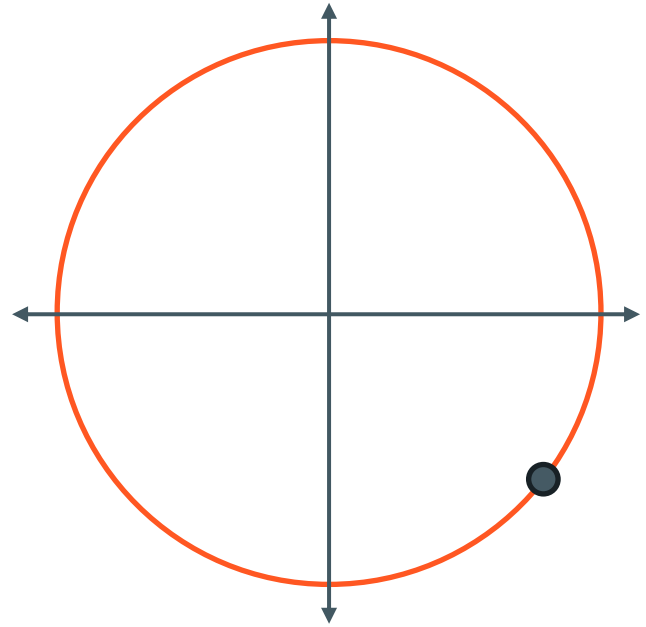


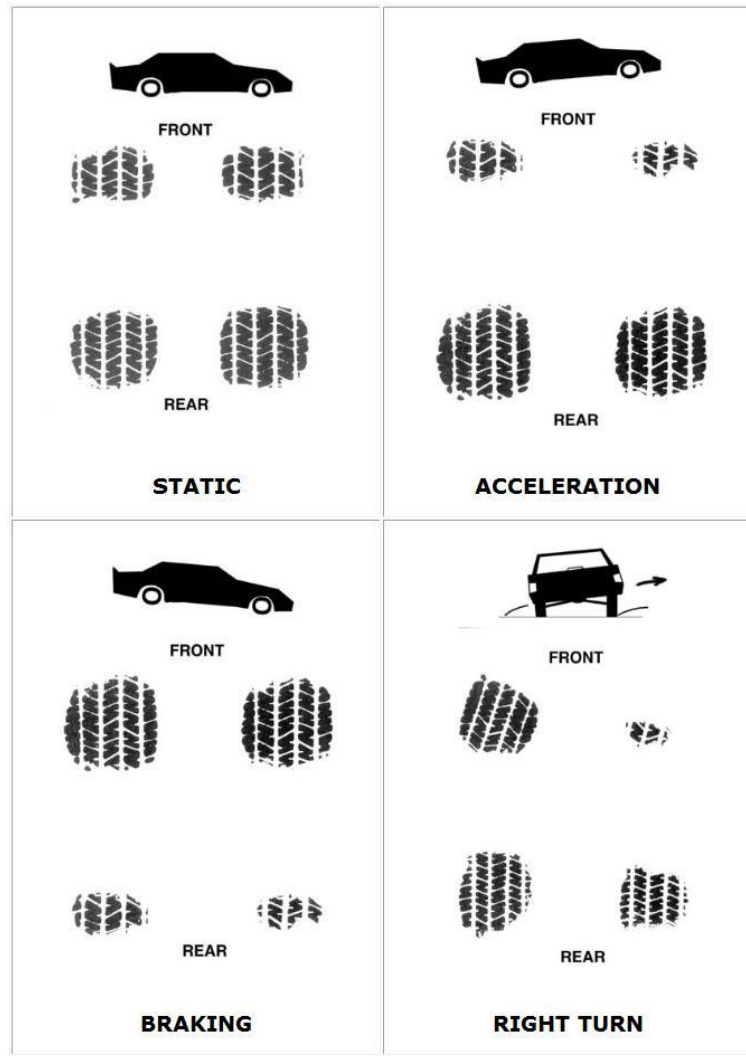
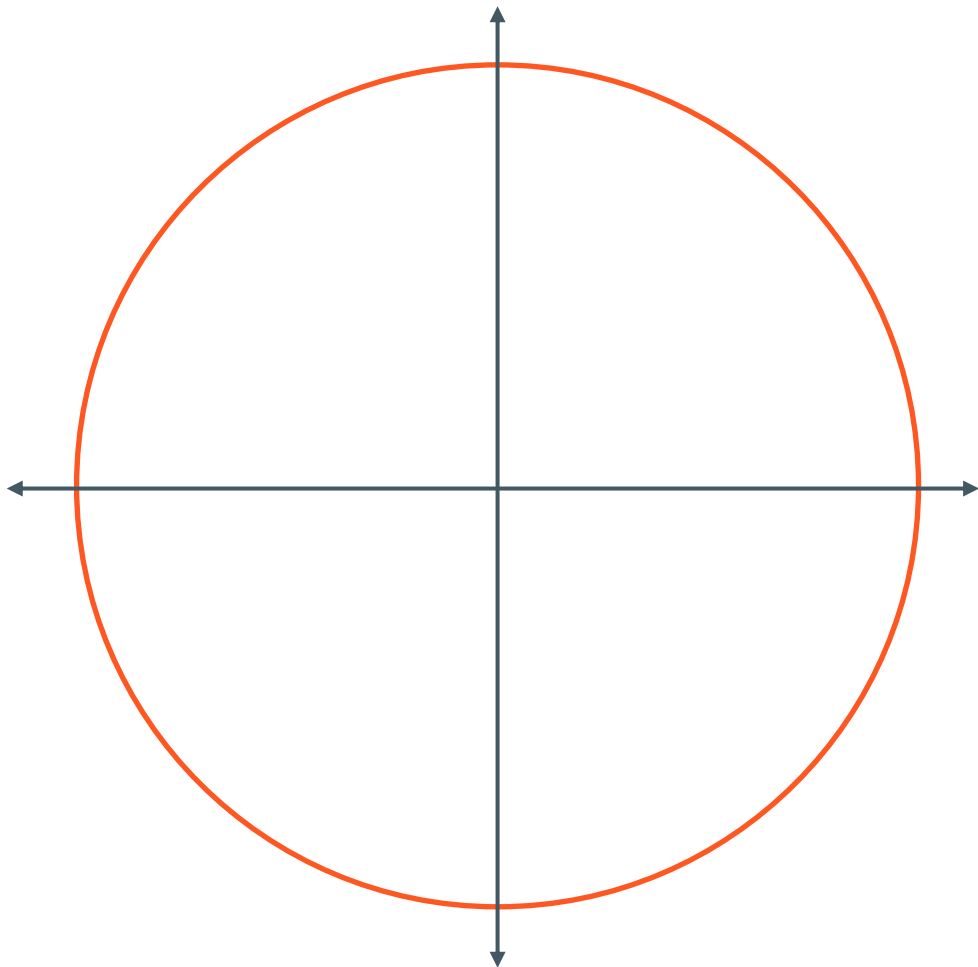
**What happens when you brake and turn at the same time?**

# What happens when you brake and turn at the same time?



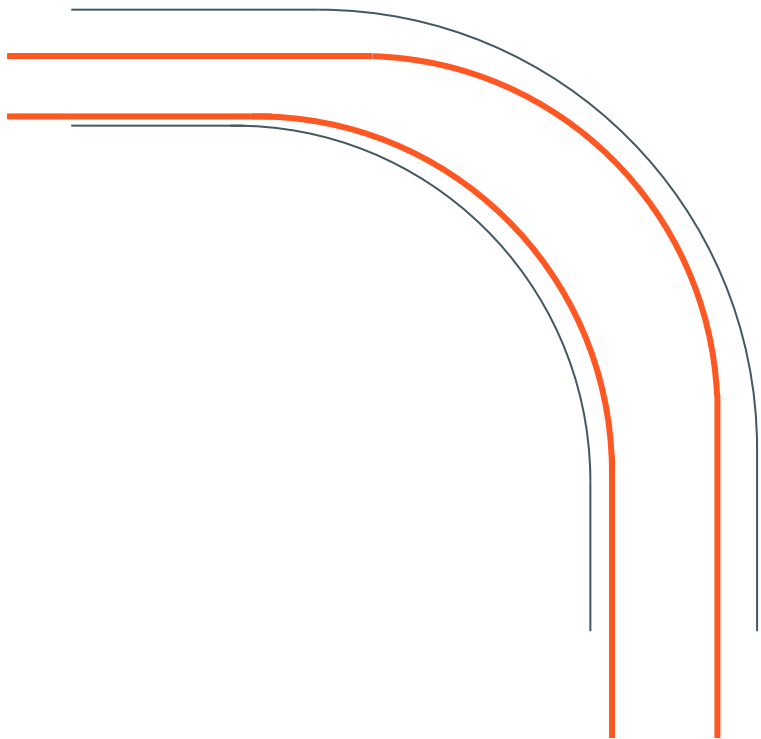
Weight shifts towards the outside of the car and towards the front of the car.



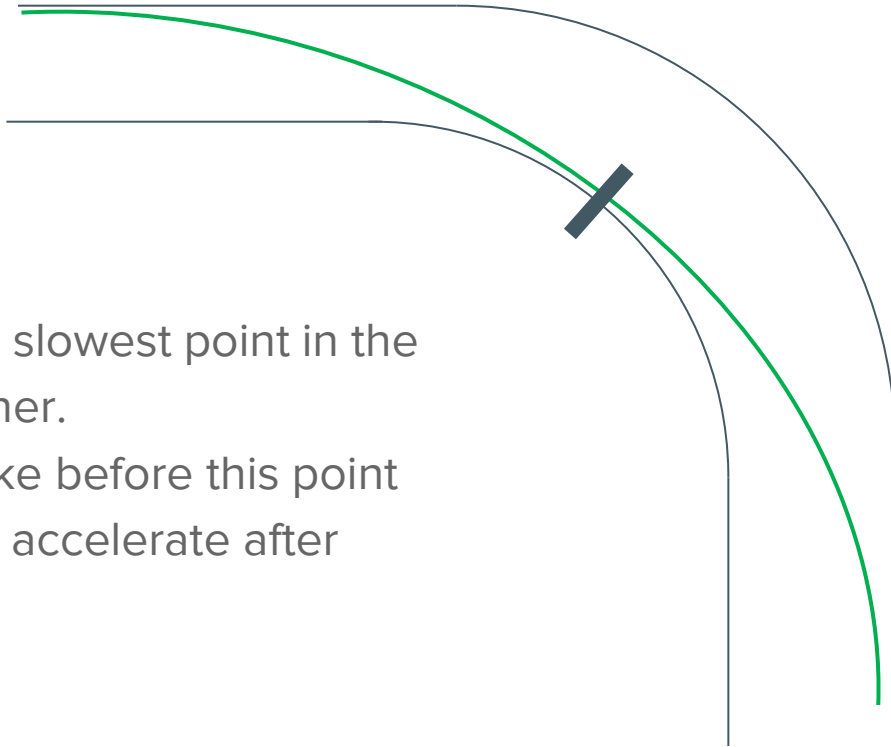


**The Driving Line**

# The Shape Of A Corner



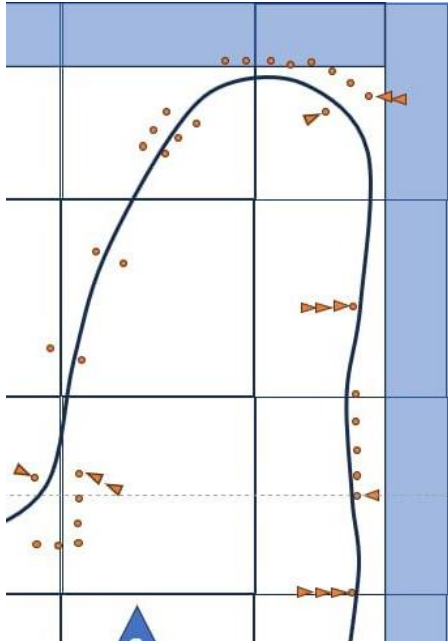
# Finding the Apex



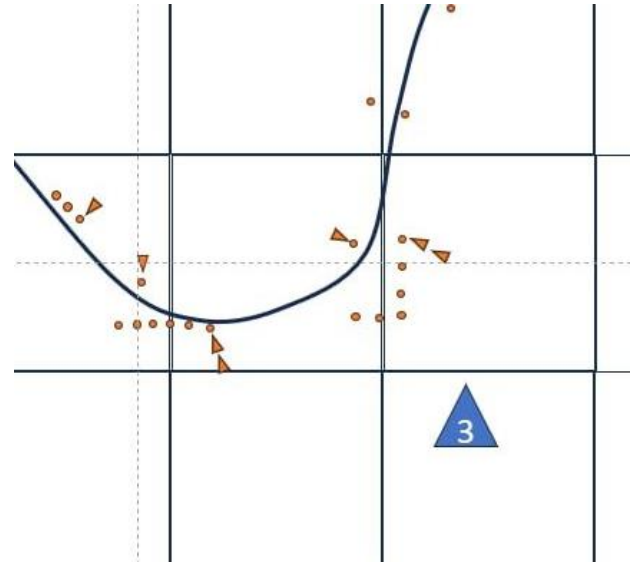
- The slowest point in the corner.
- Brake before this point and accelerate after

# Simple corners are rare

- Hairpins – narrow or wide

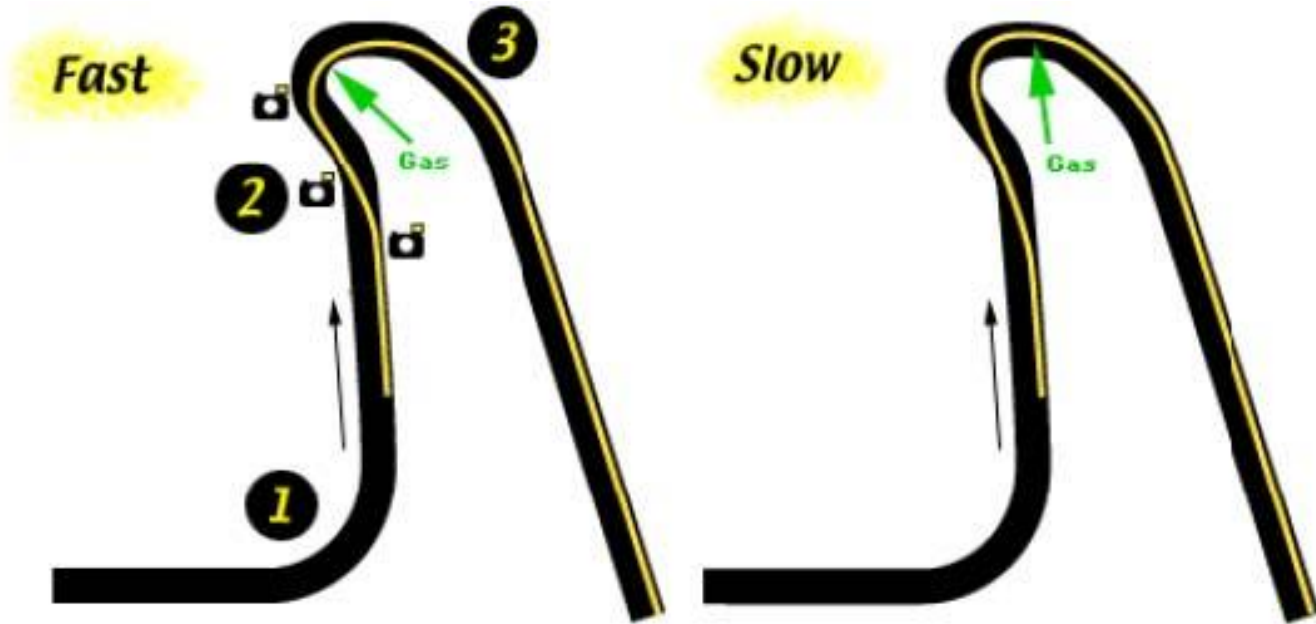


- Corner Shape



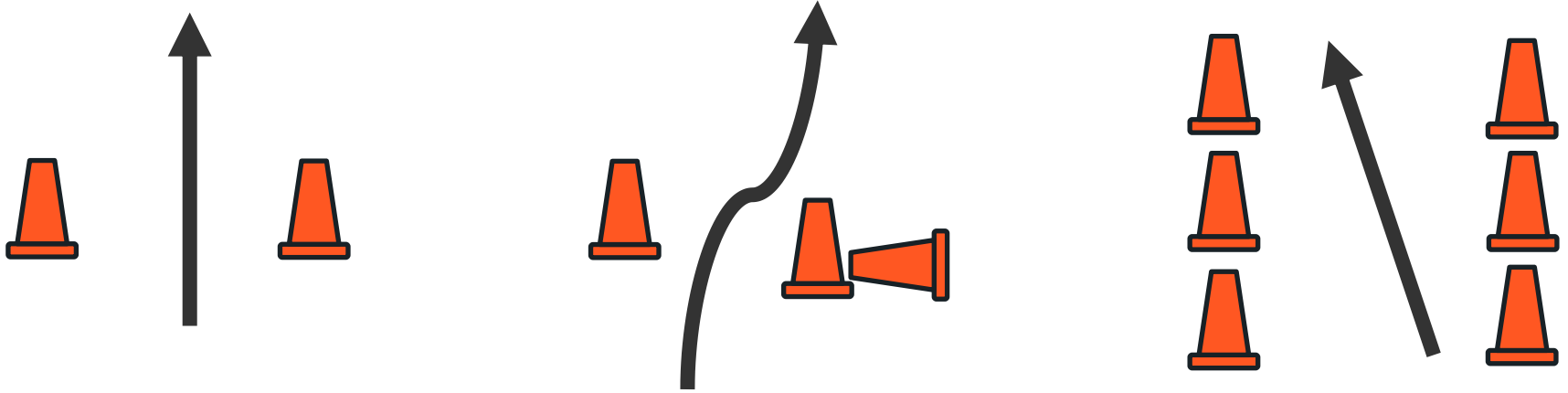
# Early and Late Apexing

- When to early apex
  - Straightaway after corner
- When to late apex
  - Slow section after corner

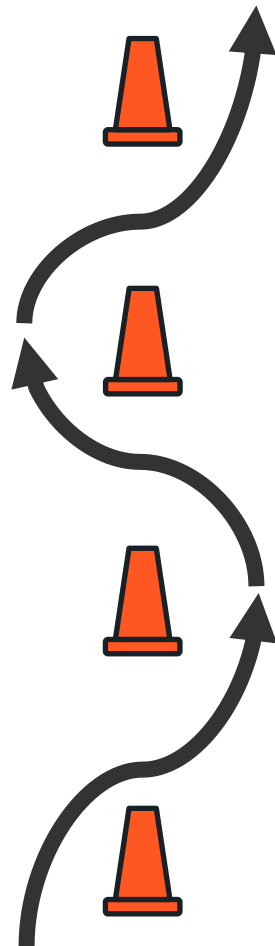
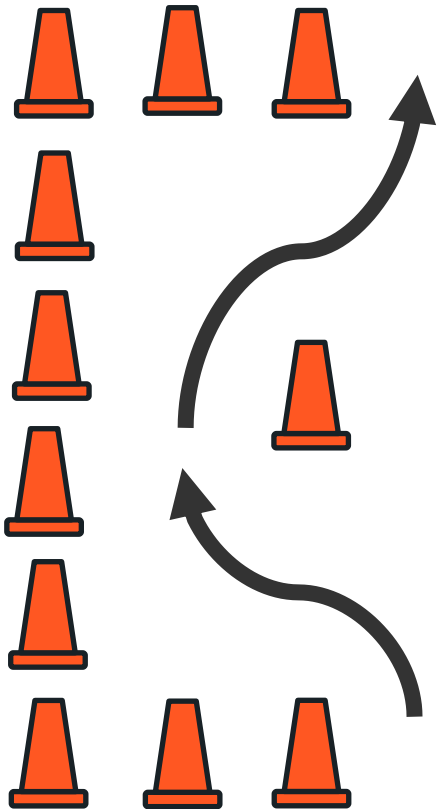


# Course Elements

# Course Elements

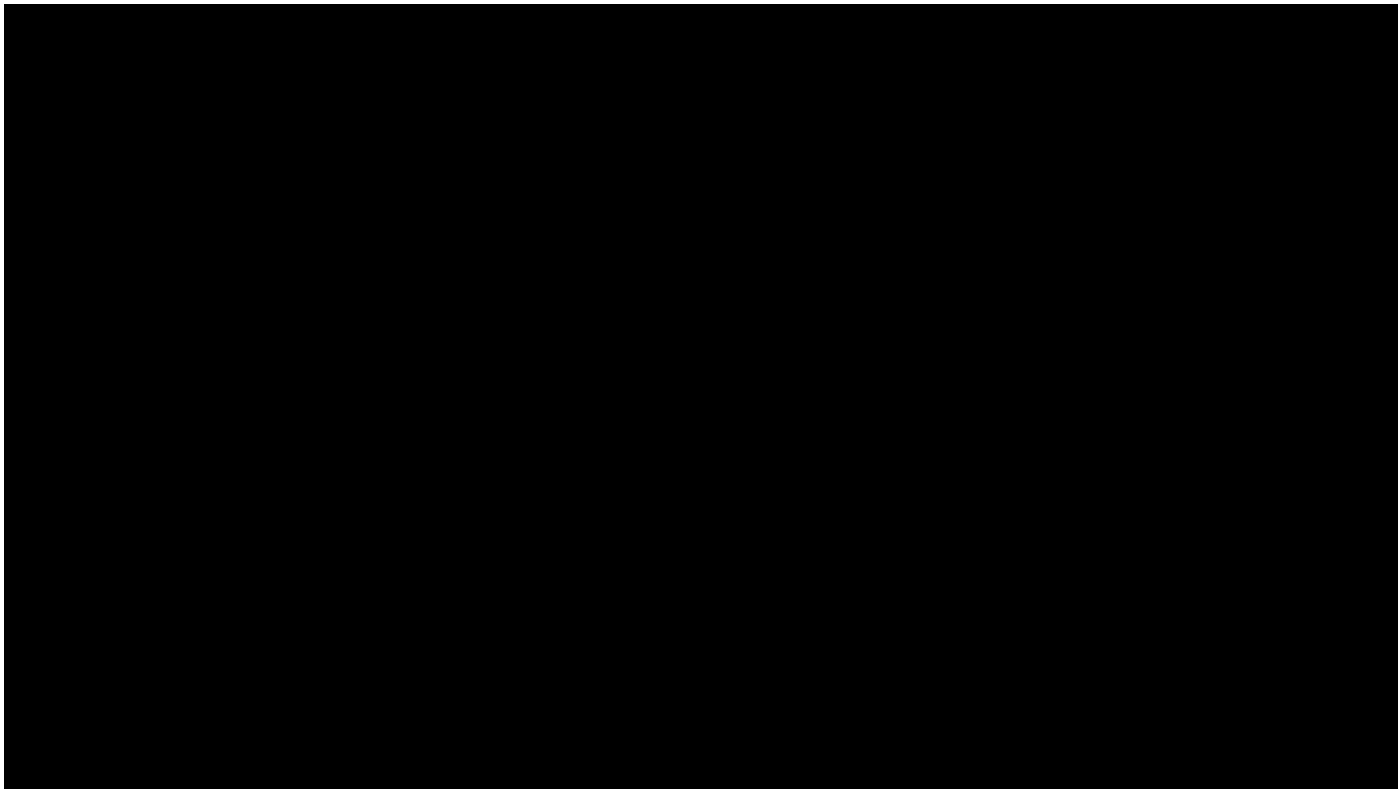


# Course Elements



# Slaloms

Slow in fast out

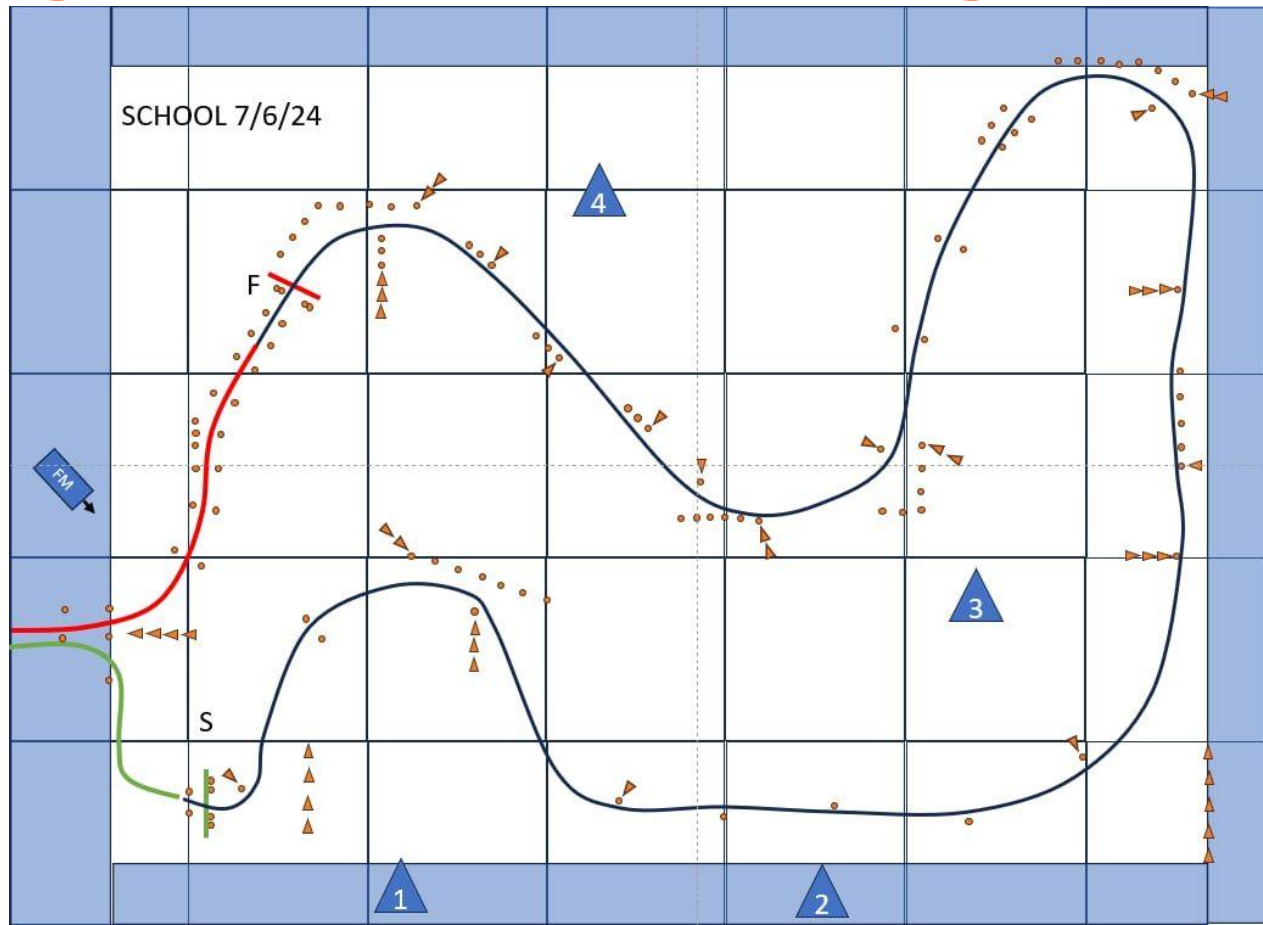


# Slaloms

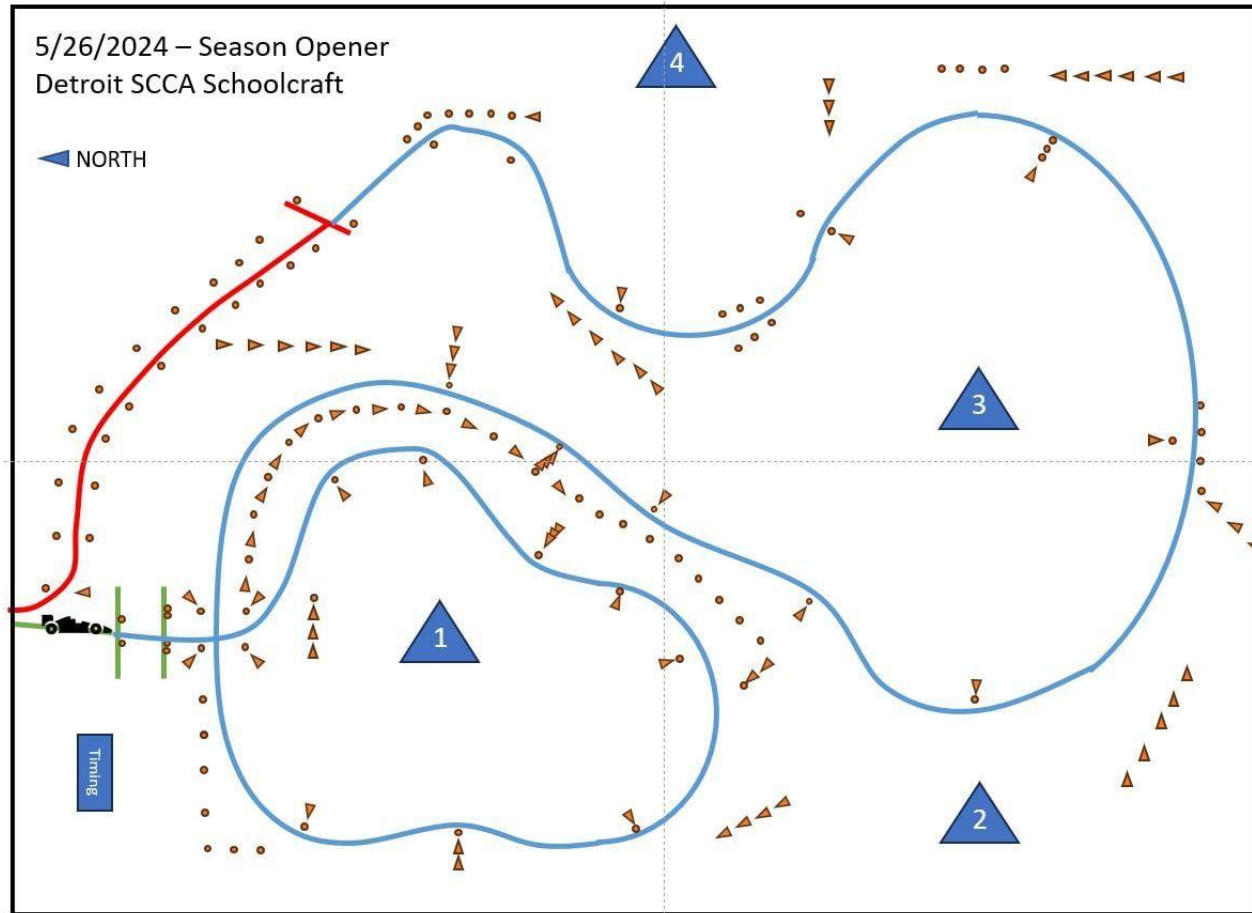
Fast in, slow out



# Putting the whole course together



# Putting the whole course together



# **Set up your driving line to give yourself longer straightaways!**

Elements that are before an opportunity to build a lot of speed are a good time to early apex

# Distance

You better have a good reason to add distance to your driving line!

# Carrying Speed In Corners

Do not waste time by trying to carry too much speed through a corner

# Attack

- Attack strategically
- Don't over drive



# Tire Noise

- Braking and turning
- Help you know when you're under driving



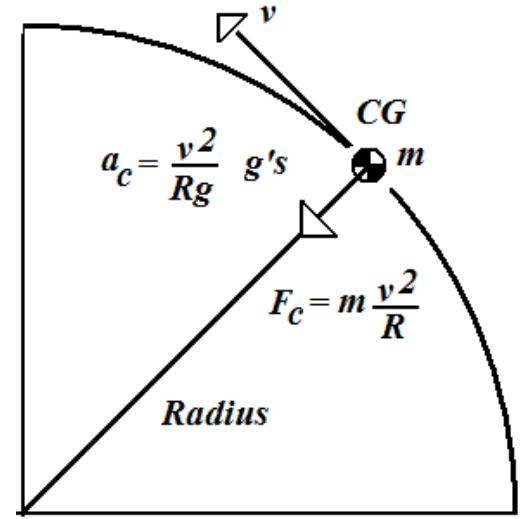
**Look Ahead**



# Look Where You Want To Go

- Don't focus on the thing right in front of you
- Braking Zone
- Apex
- Throttle Zones

[Kevin Magnussen Eye Tracking Video](#)



**Mental Game**

# **Mental game: know the course**

Course walking is a skill. Take what you learn and improve the next time you walk a course



# **Mistake minimization**

There is no such thing as the  
“perfect autocross run.”

You will make mistakes.

# **Mistake minimization**

Don't dwell on them.

# Dealing with Mistakes

- Making mistakes can put a lot of pressure on you, especially at higher levels of competition
- Be reasonable with yourself and your machinery
- If you are making mistakes and unhappy with your times, looking at where you sit in the standings and your competitors times can hurt more than help
- Three deep breaths
- Think about what to improve

# Rituals

## Pre Run Ritual

- Do you get in your car last second OR, do you get in your car way ahead of time.
- Do you chat with people around you OR  
Do you sit and think about what you need to do?
- When does your helmet go on
- When do you turn on your camera or data recorder
- Do you try to hype yourself up and be energetic OR do you stay calm and cool

## Post Run Ritual

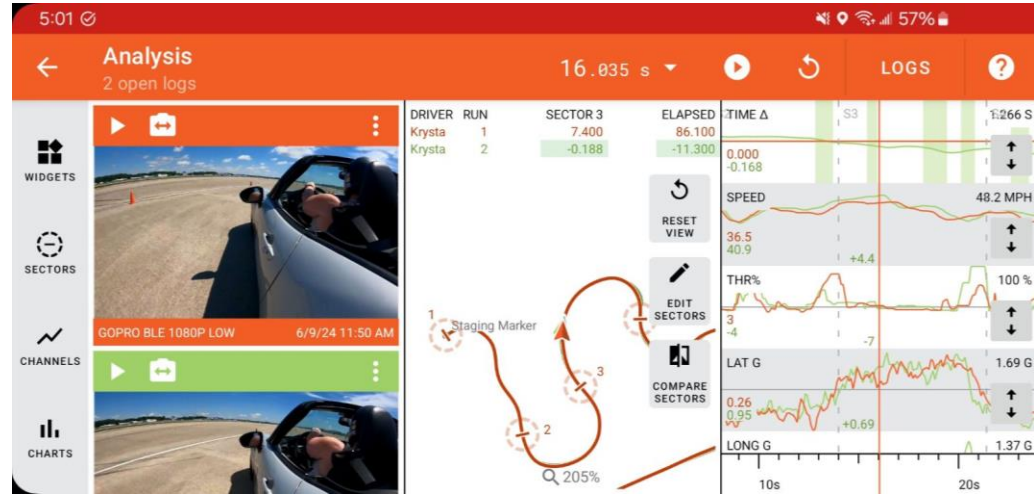
- Stop go pro or data recording
- Check tire pressures
- If you are in a two driver car, change numbers
- When do you think about your previous run and analyze it

# Run to Run Improvements

- Analyze your last run and figure out what you didn't do well enough
- Maybe it was a blatant mistake
- Maybe it's a section of the course that you know you can gain time in
- Focus on 1 or at most 2 things and improve on them

# Data

- SoloStorm is a data acquisition system that can be used on any Android device to record data during an Autox run.
- SoloStorm works with Bluetooth OBD II & an External GPS.
- Other options (Free)
  - Track Addict
  - Harrys Lap Timer
  - Race Chrono Lite



# Mental Practice When Not Autocrossing

- Look ahead on the street
- Left foot brake
- Heel toe downshift



# Discussion

There are two drivers, Driver A and Driver B. Both are driving the same type of car. Both are driving on the same autocross course. Driver A posts a faster run time than Driver B.

Why?

# Discussion

There are two drivers, Driver A and Driver B. Both are driving the same type of car. Both are driving on the same autocross course. Driver A posts a faster run time than Driver B.

Driver A spends more time on the throttle and less time on the brakes than Driver B!

**Q&A**

**What questions do you have for the  
instructors present?**