Velocity Graphs

IB PHYSICS | MOTION

What is…

Speed

The rate of change of position

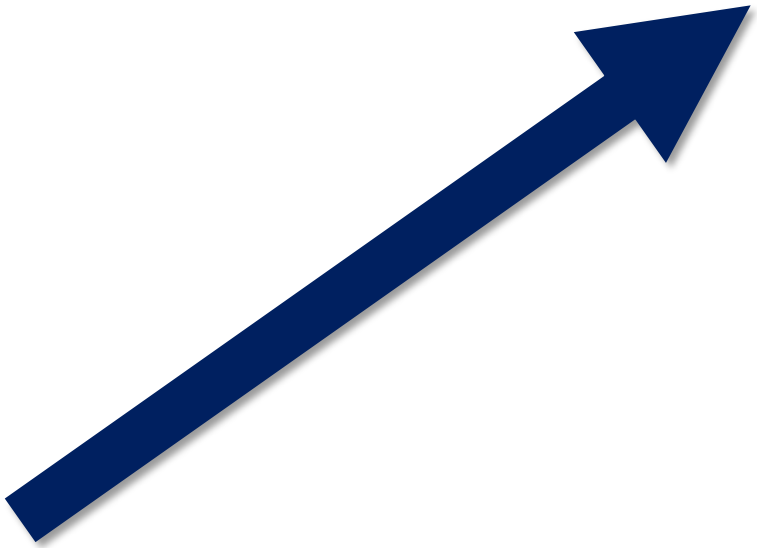
"how fast"

Velocity

Speed **with direction**

What is a Vector?

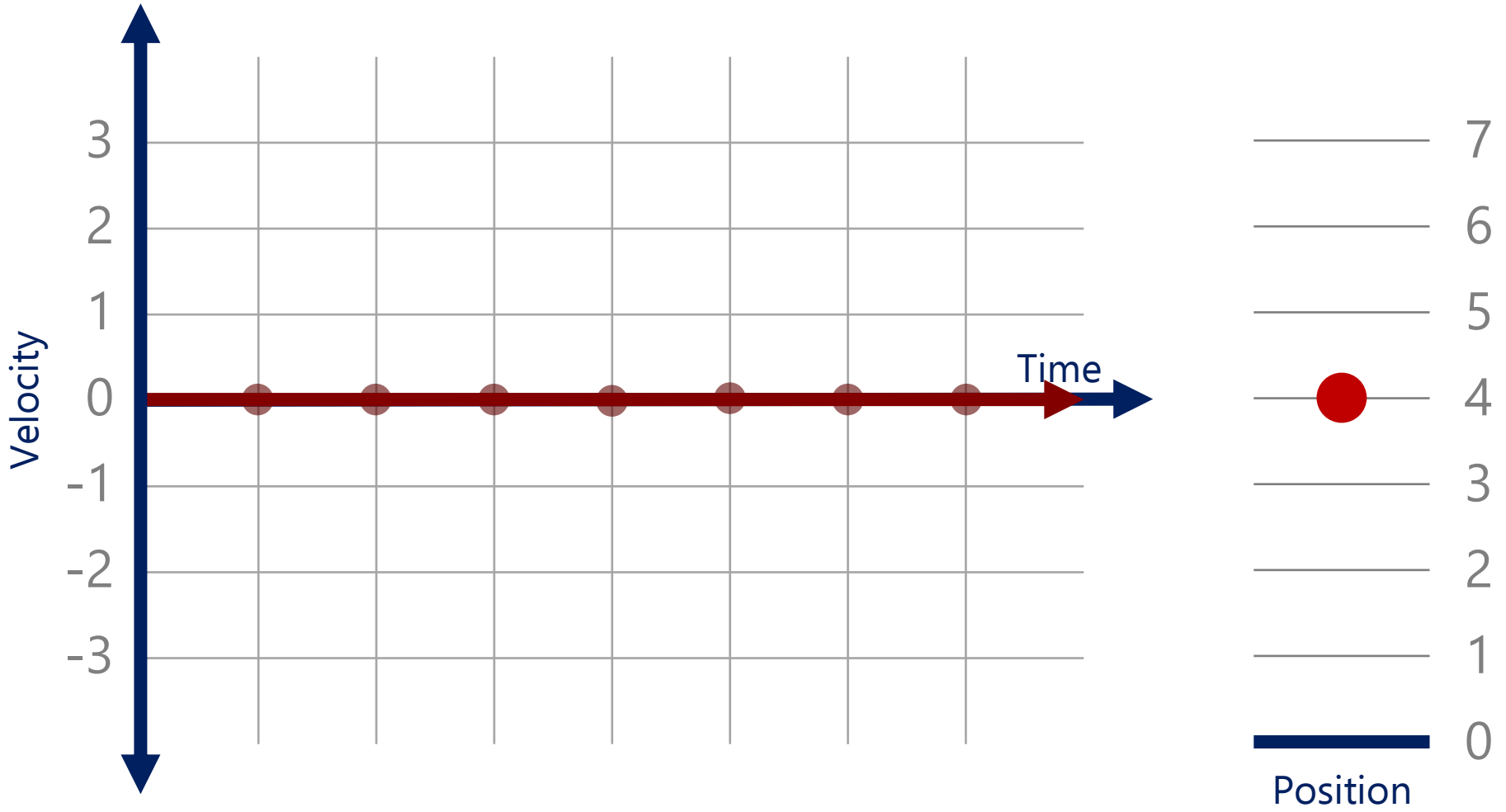
A Vector is a quantity that includes both **direction** and **magnitude**



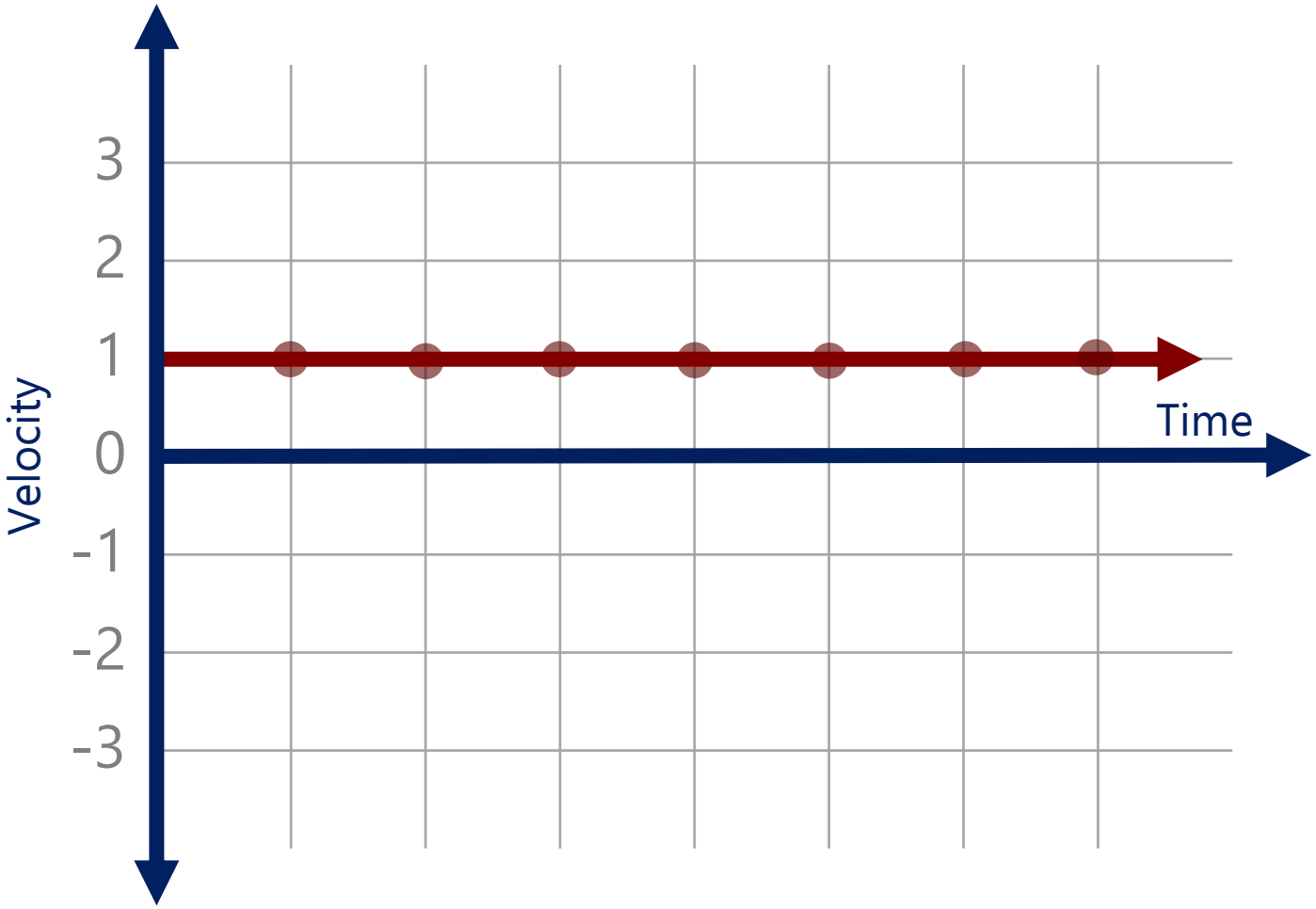
Vector vs Scalar

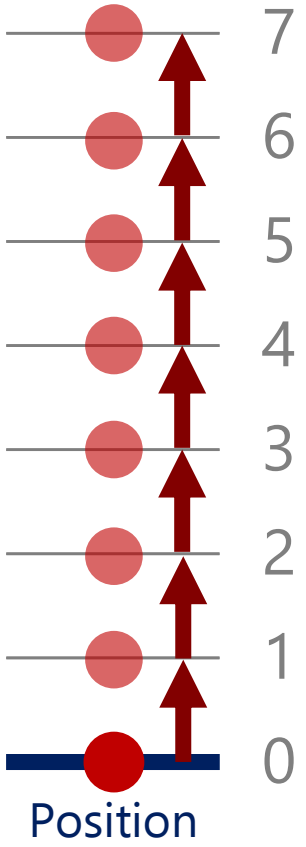
Vector Quantities	Scalar Quantities
Displacement	Distance
Velocity	Speed
Force	Energy
Can be negative to indicate direction	Only Positive

An object not moving

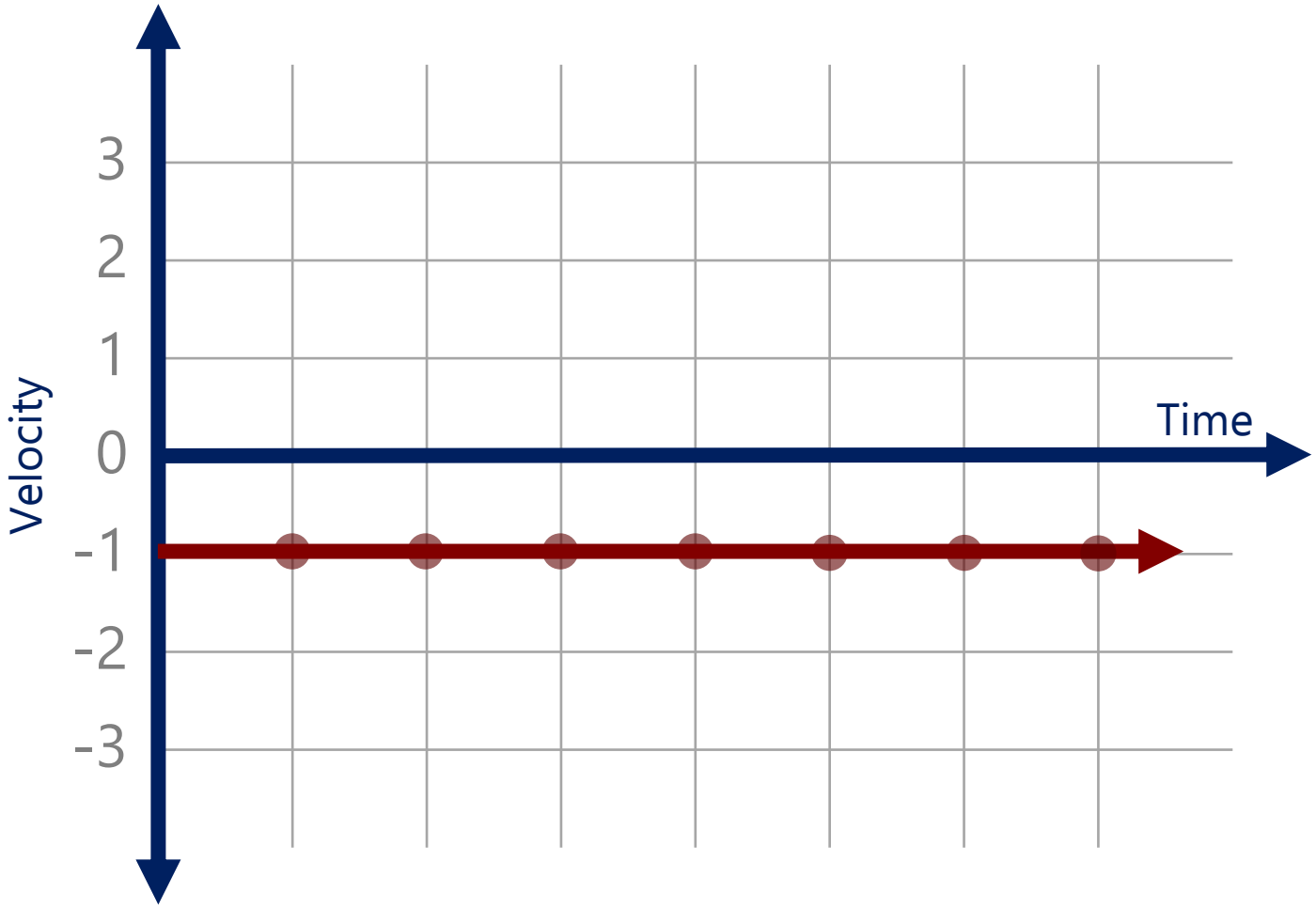


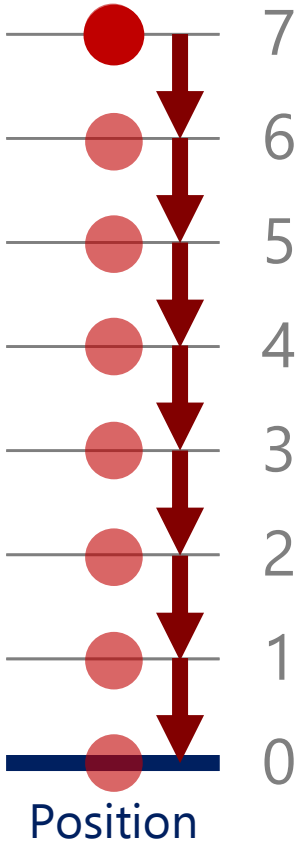
An object moving forward



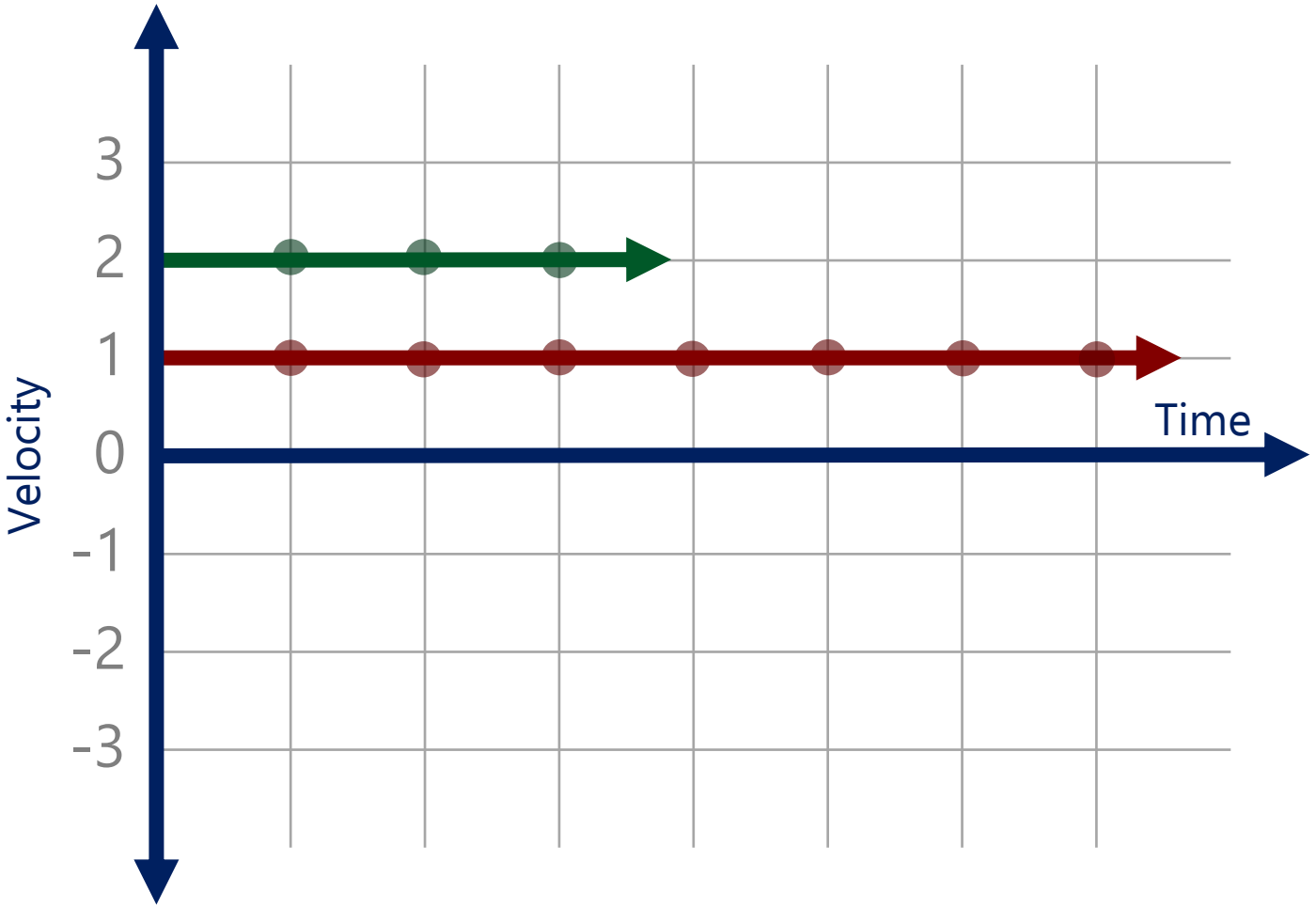


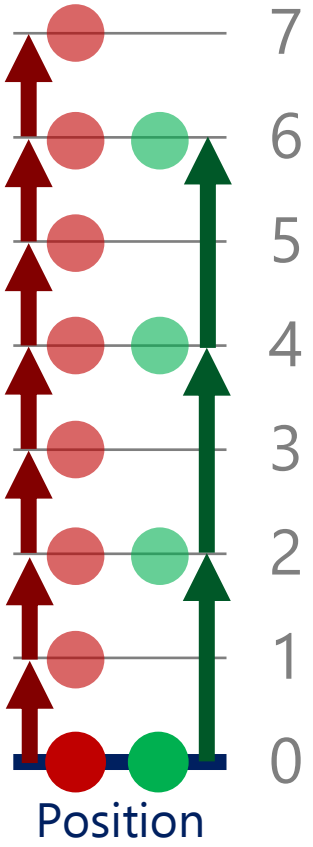
An object moving backward



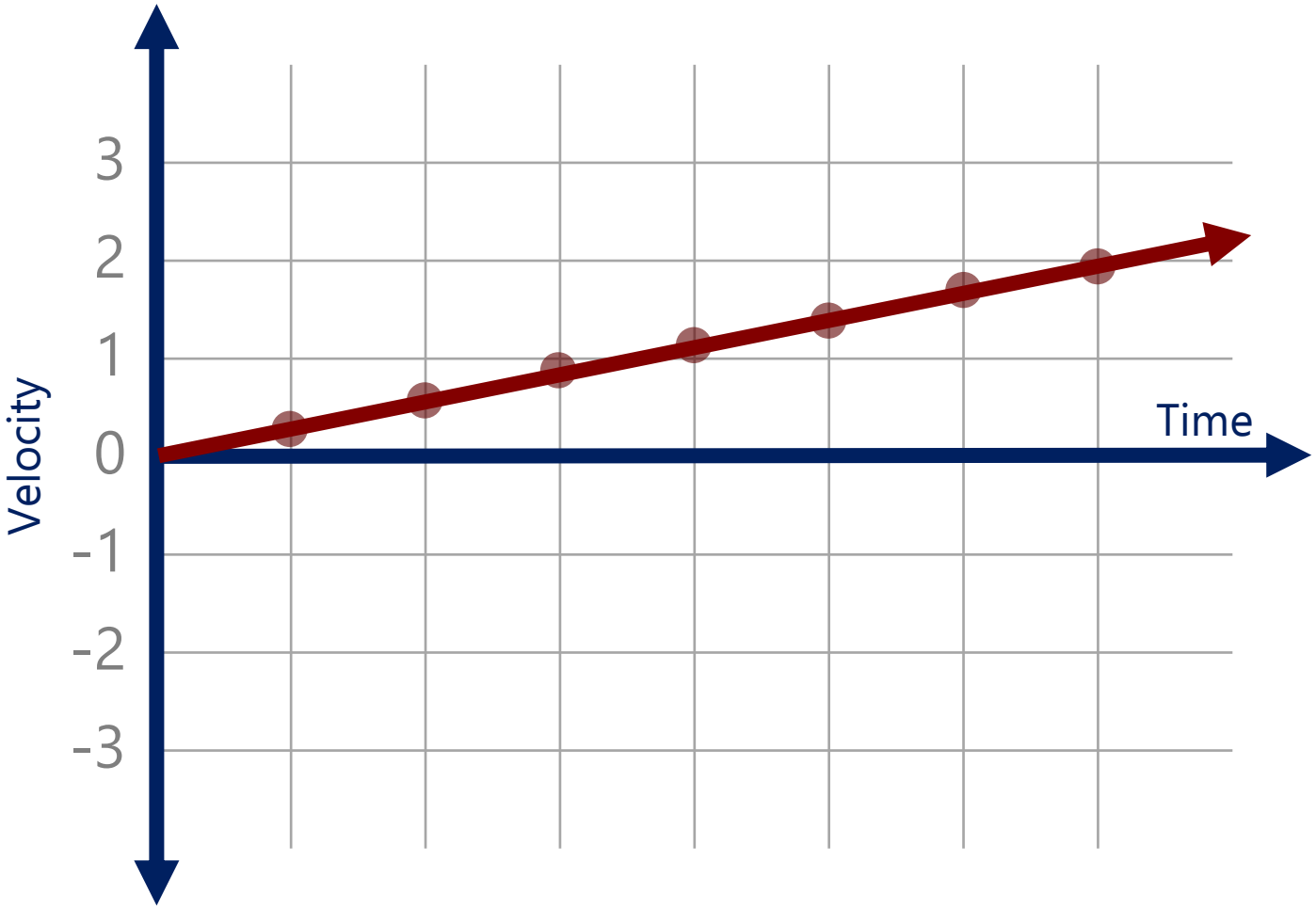


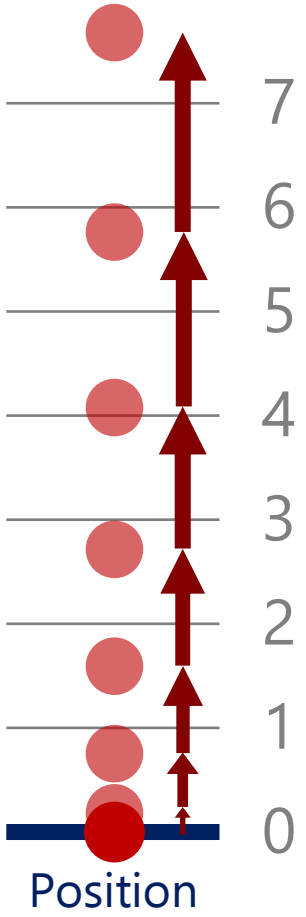
Showing Velocity



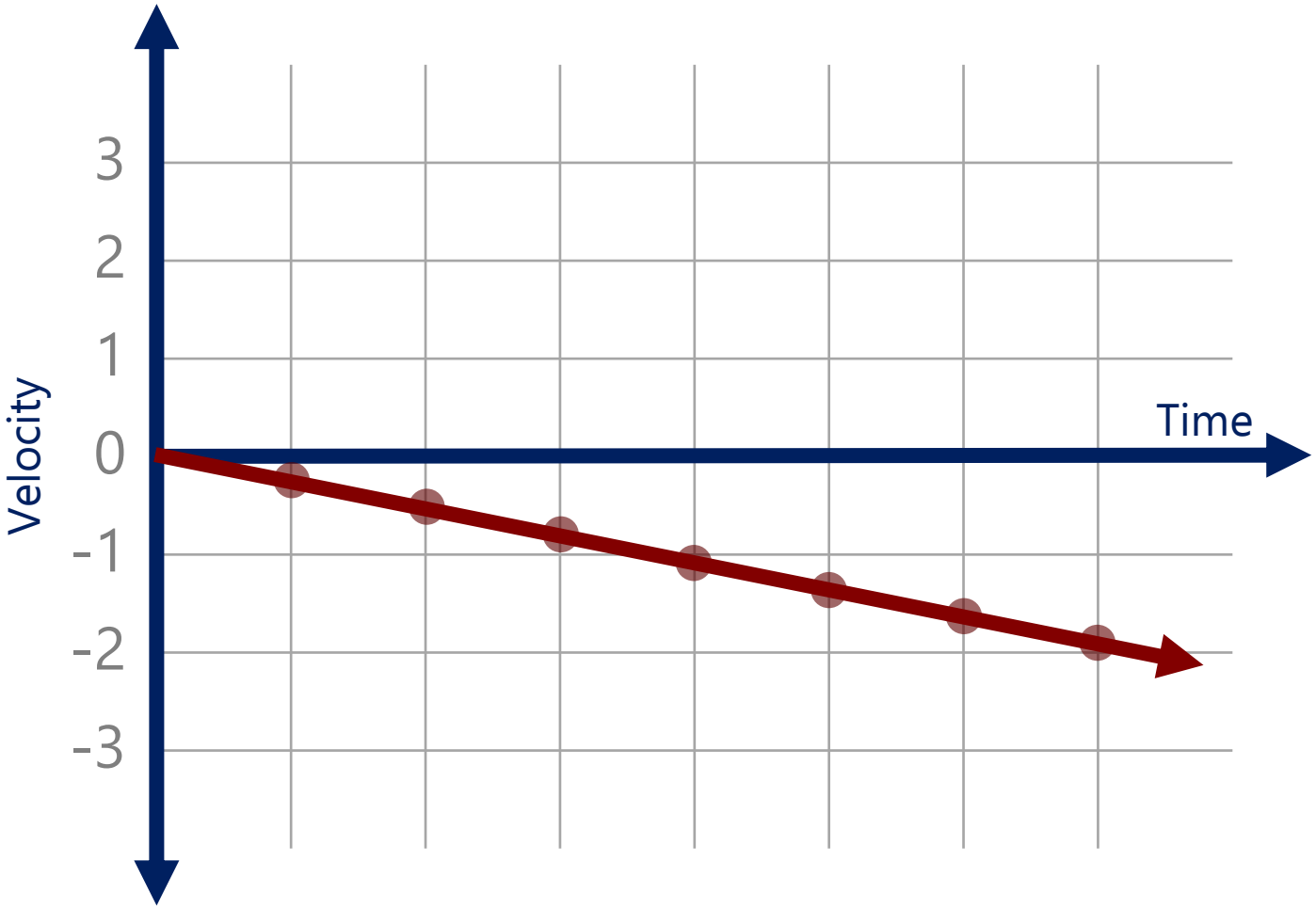


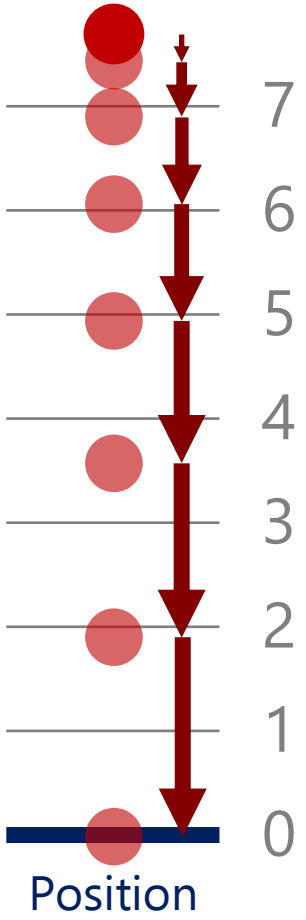
Speeding Up (moving positive)



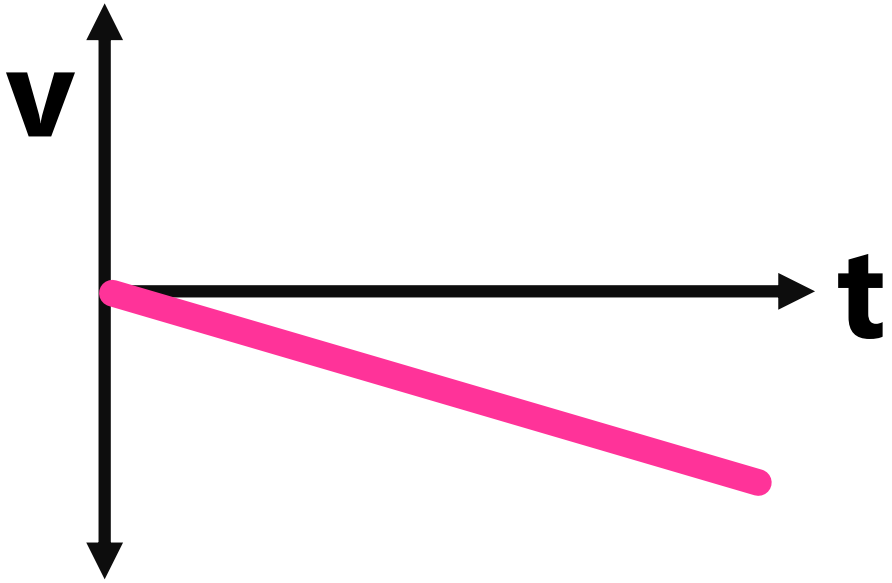


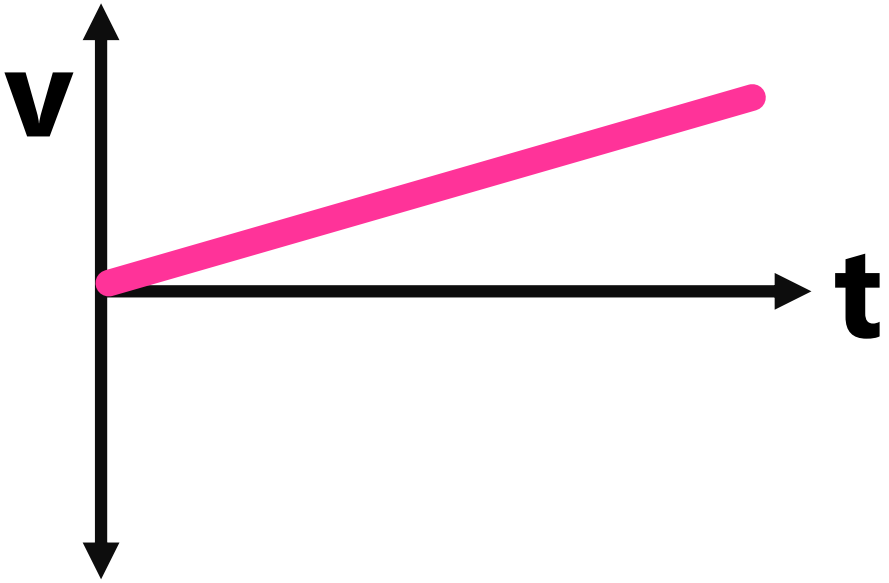
Speeding Up (moving negative)





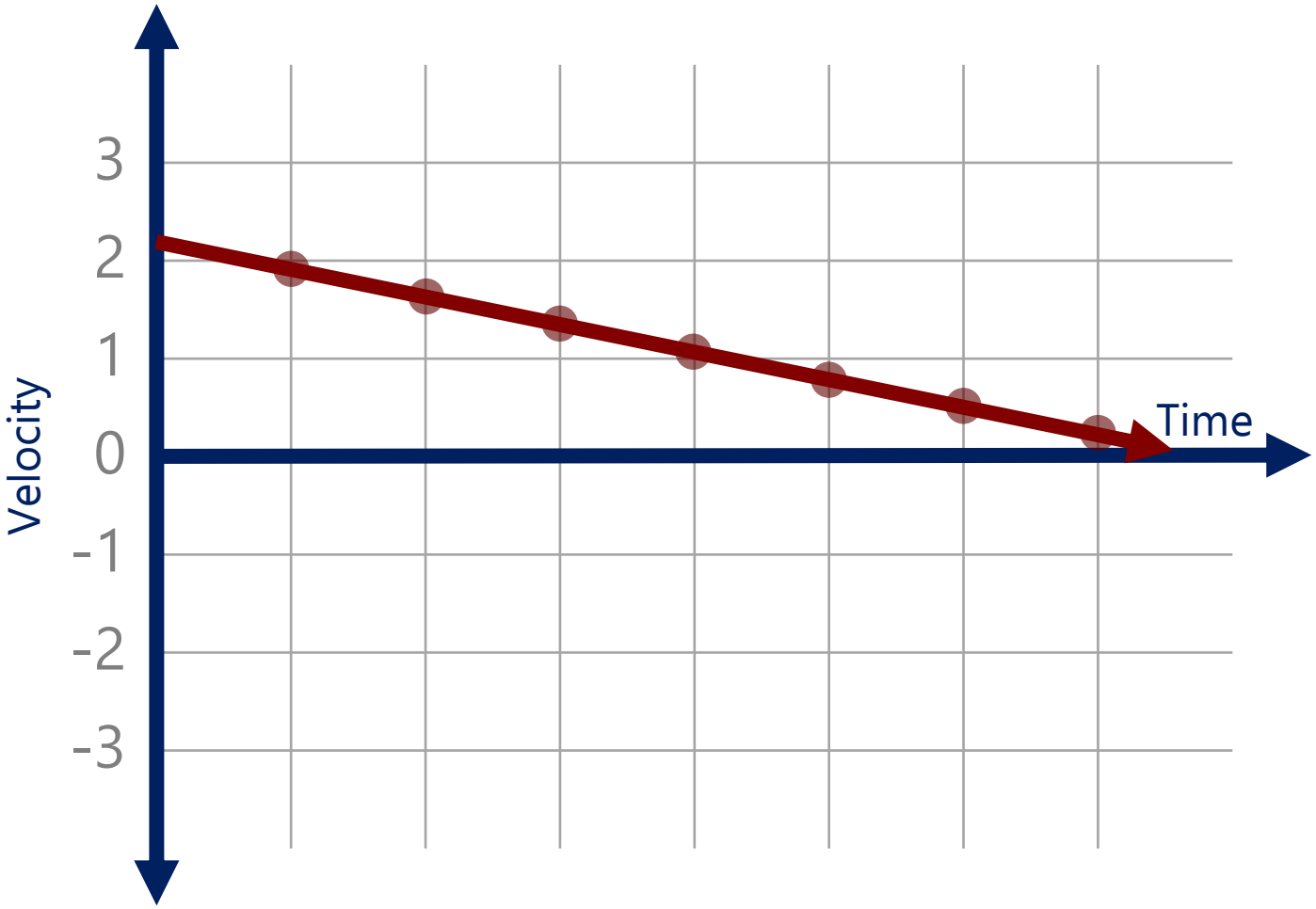
How are these Similar?

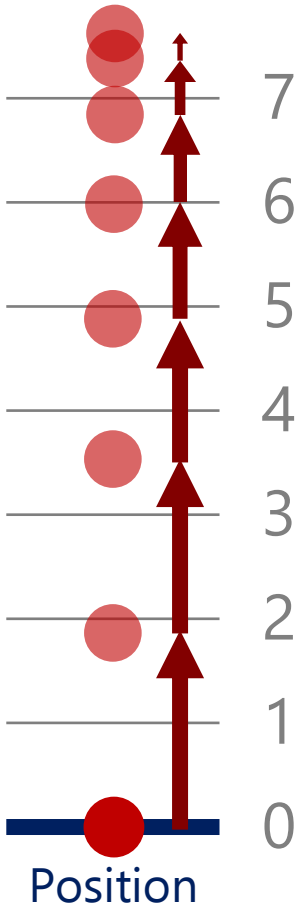




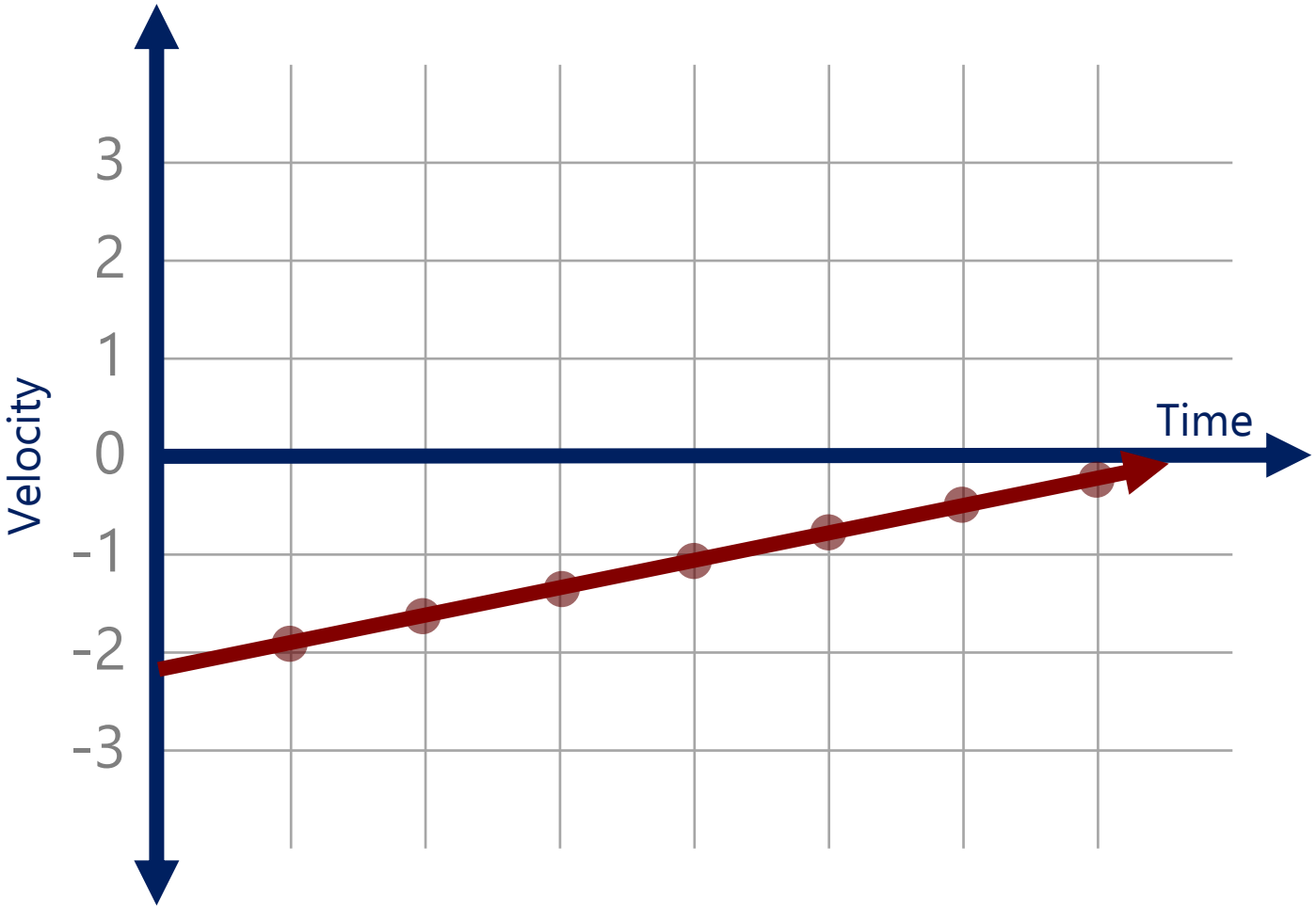
Getting faster because velocity is getting farther from zero

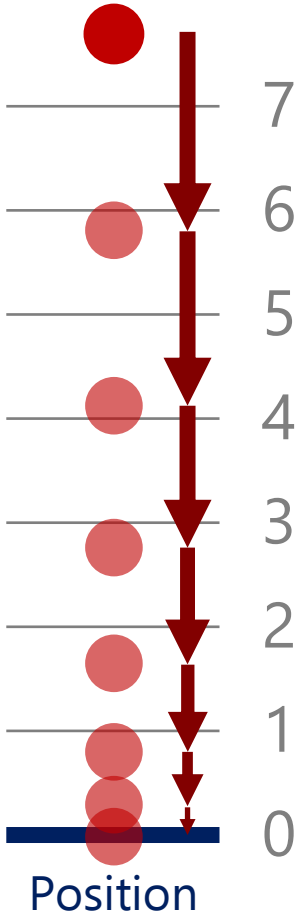
Slowing Down (moving positive)





Slowing Down (moving negative)



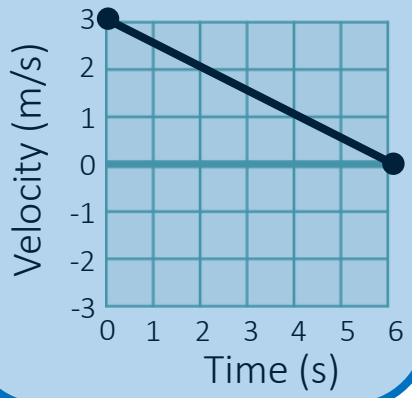


Velocity vs Time Graphs

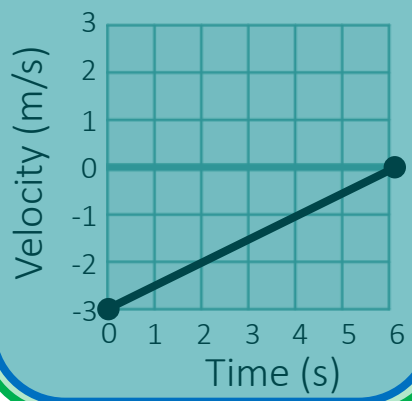
Which graph(s) represent an object moving in the negative direction?

Which graph(s) represent an object slowing down?

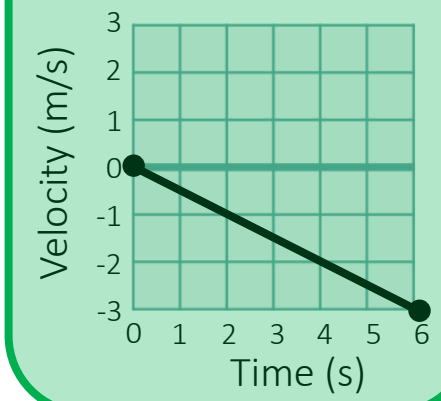
A



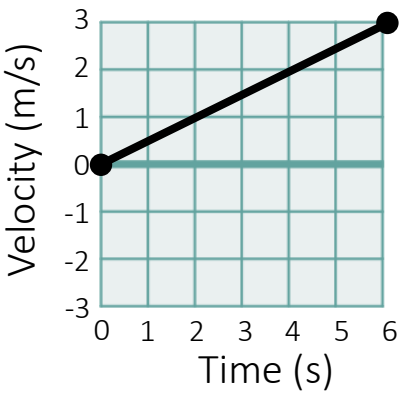
B



C



D



What is…

Velocity

change in **position** over time

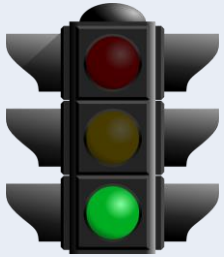
"speed *with direction*"

Acceleration

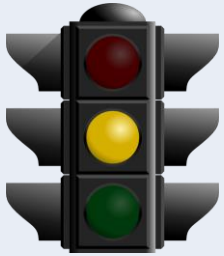
change in **velocity** over time

Types of Acceleration

Speeding Up

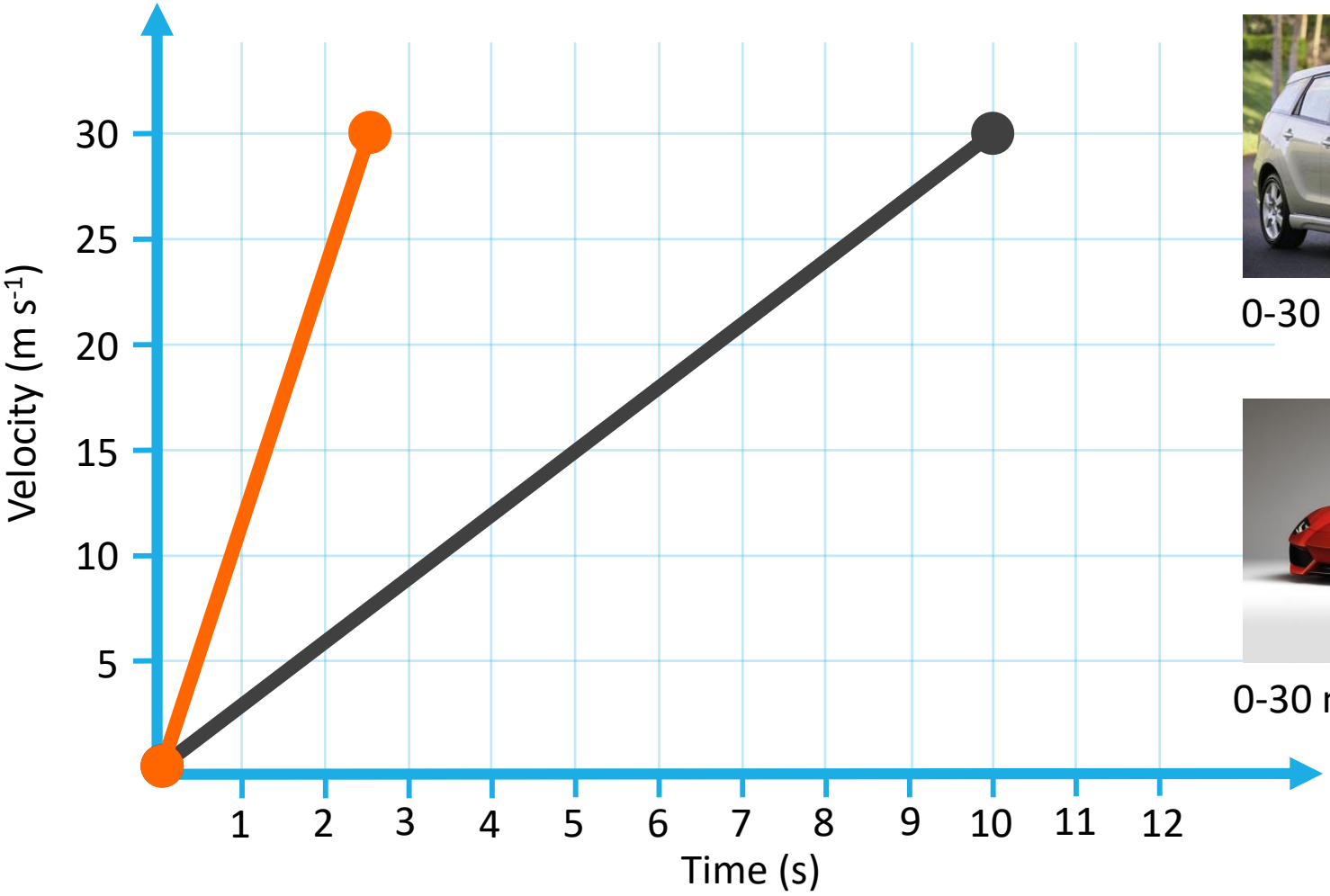


Slowing Down



Changing Direction

Acceleration is Related to Force



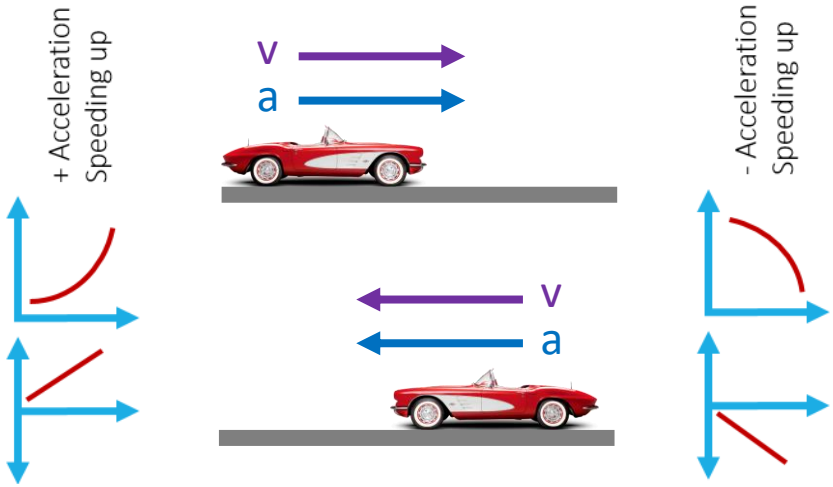
0-30 m s^{-1} in 10 seconds

0-30 m s^{-1} in 2.5 seconds

Acceleration | Slowing or Speeding?

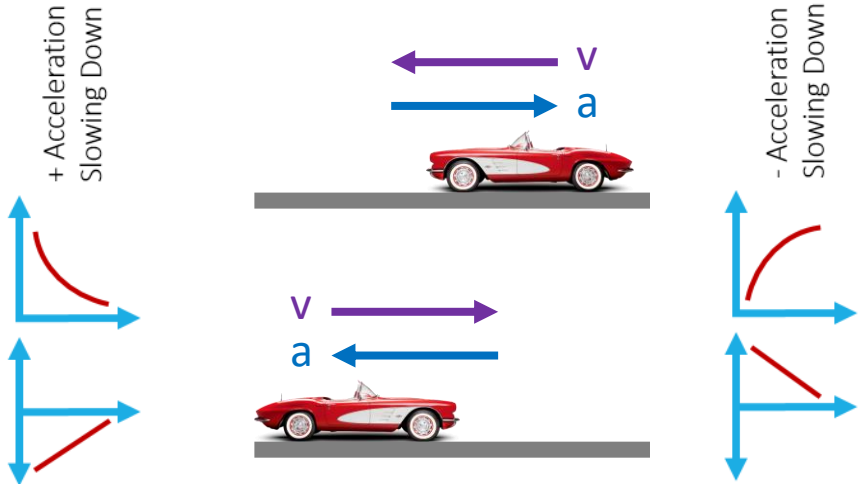
When the acceleration is in the **same** direction as the velocity the object is _____speeding up_____

"Foot on the Gas"



When the acceleration is in the **opposite** direction as the velocity the object is _____slowing down_____

"Foot on the Brake"



Lesson Takeaways

- ❑ I can describe the difference between speed and velocity
- ❑ I can compare the difference between a vector and scalar quantity
- ❑ I can plot constant velocity on a velocity vs time graph
- ❑ I can plot changing velocity on a velocity vs time graph
- ❑ I can use a velocity vs time graph to identify if an object is moving in the positive or negative direction as well as if it is speeding up or slowing down
- ❑ I can define acceleration in terms of velocity