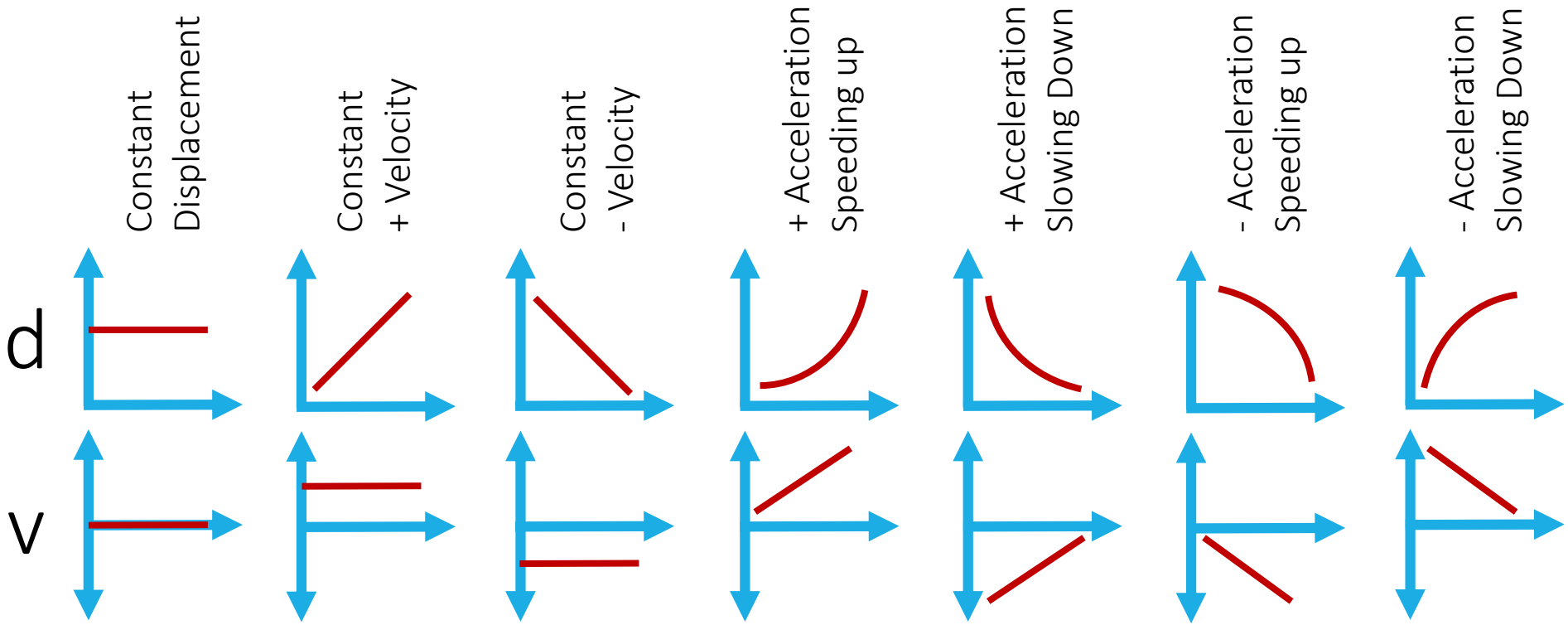
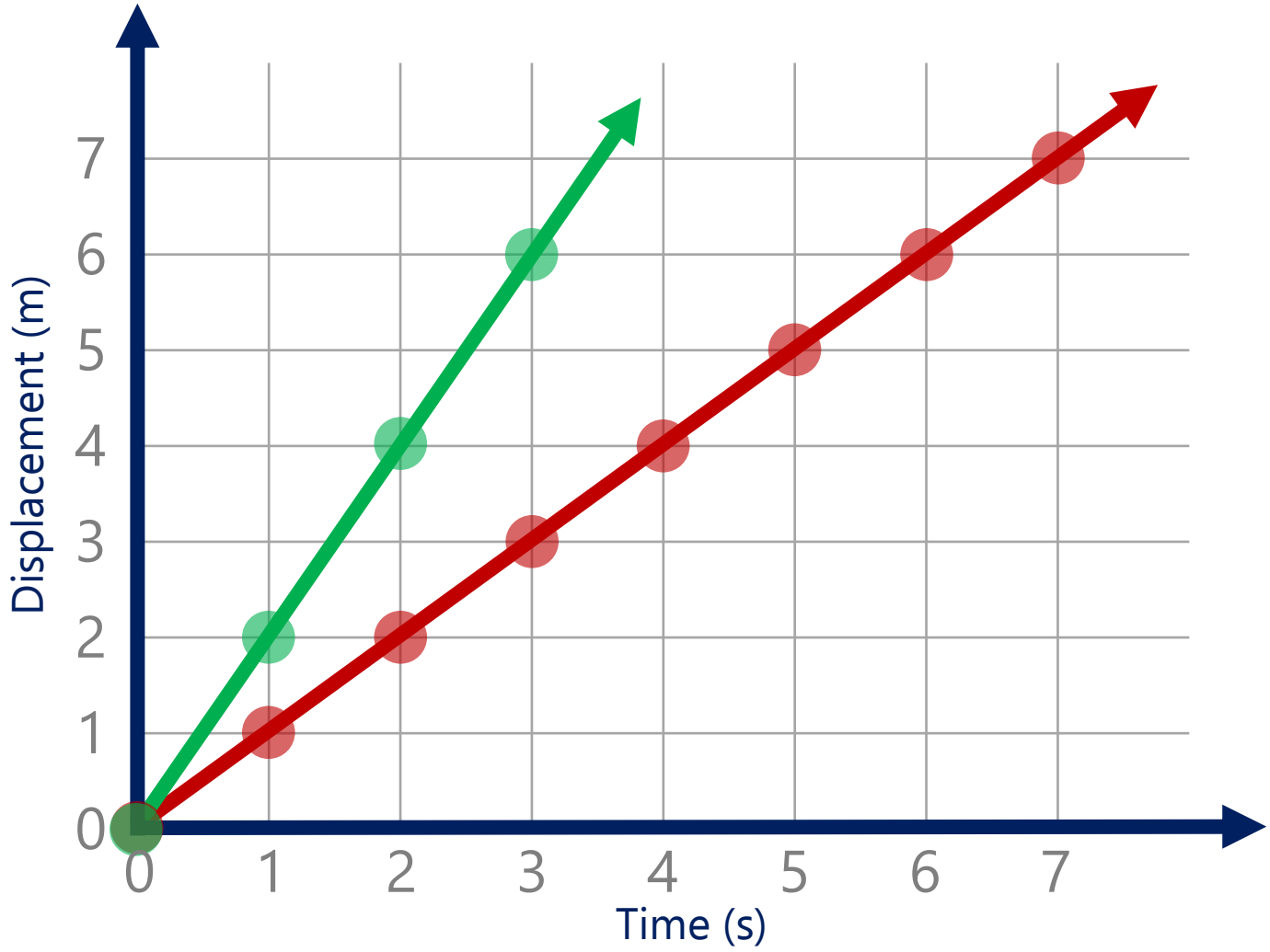
Calculating from Graphs

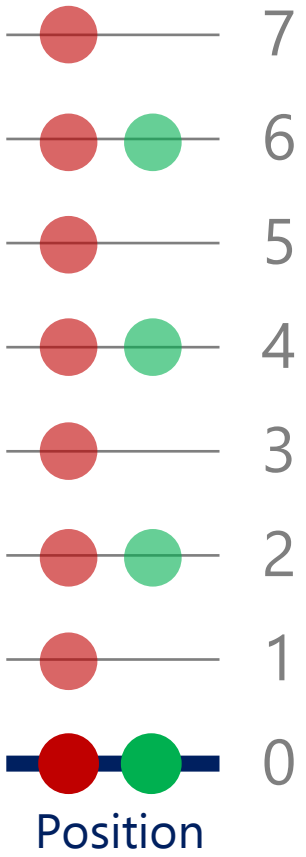
IB PHYSICS | MOTION

Motion Graphs Guide

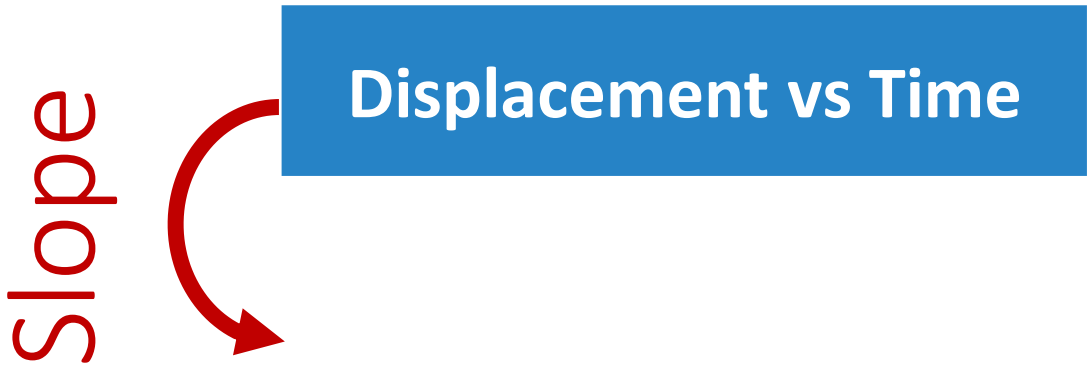


Calculating Instantaneous Velocity





The power of the slope!



Average Speed and Velocity

$$\text{Average Speed} = \frac{Total\ Distance}{Total\ Time}$$

* Always Positive

$$\text{Average Velocity} = \frac{Total\ Displacement}{Total\ Time}$$

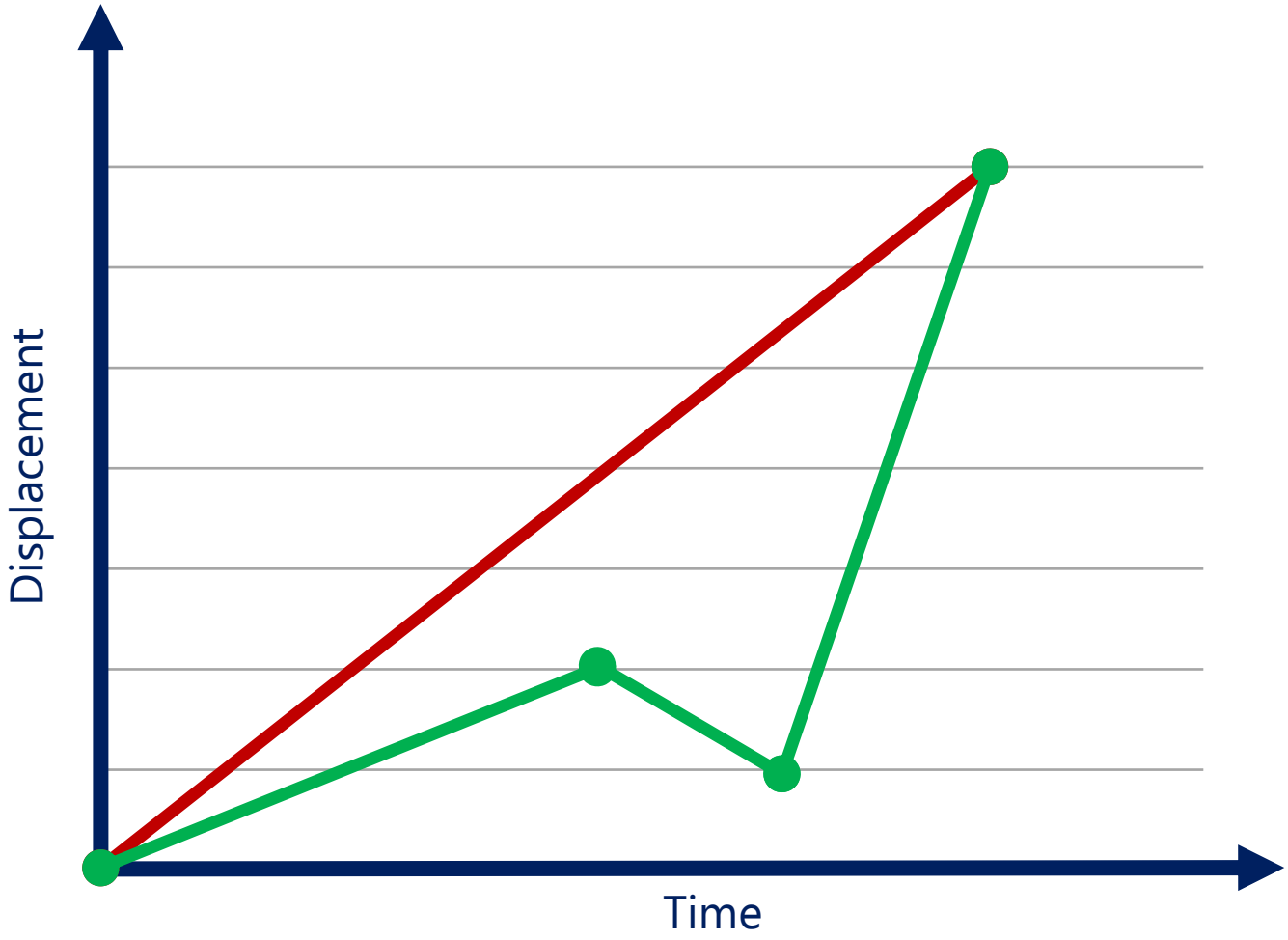
* Includes Direction

Calculating Average Speed

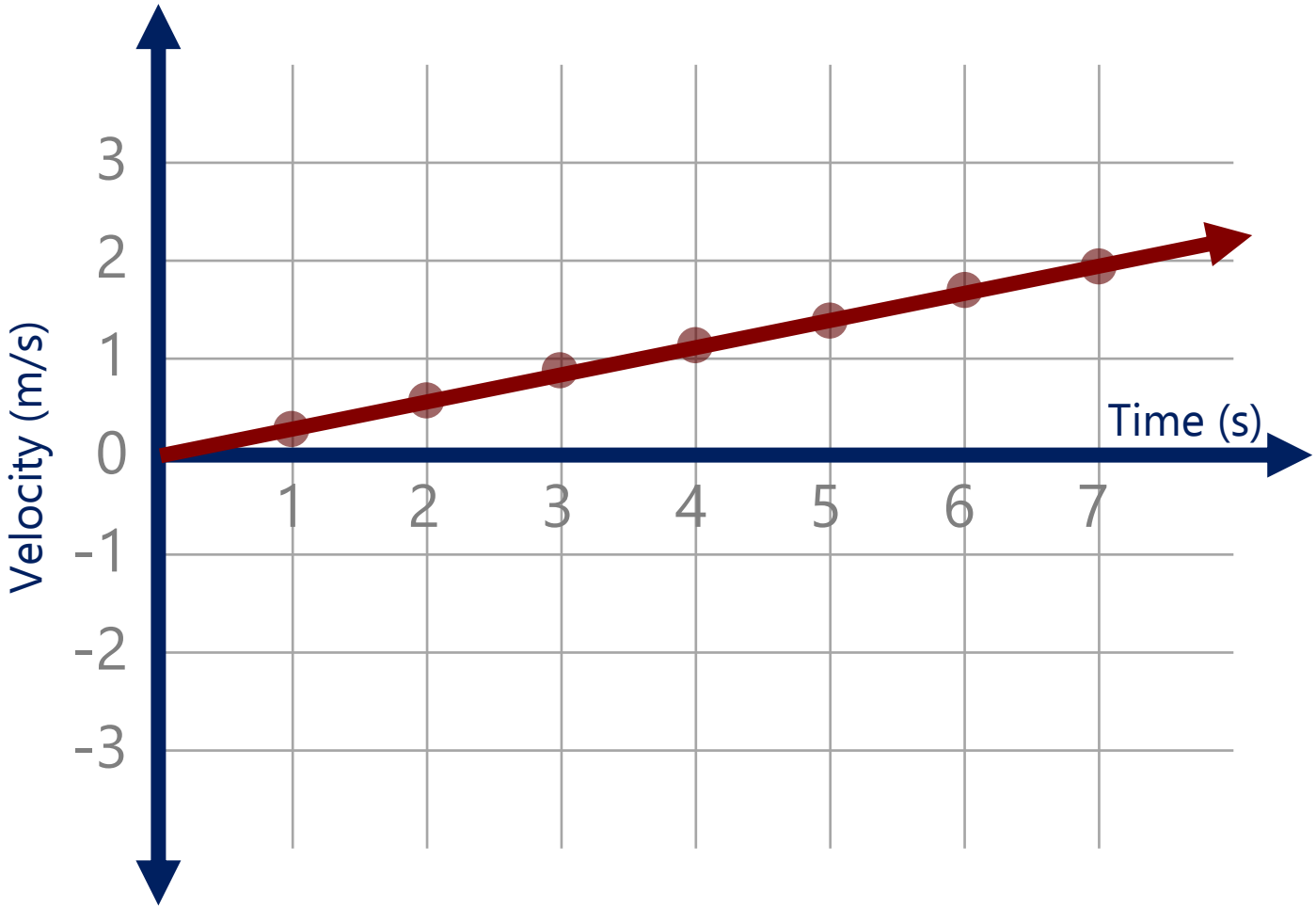
Eliud Kipchoge broke the 2-hour marathon (26.2 miles) in October of 2019. Kipchoge finished in 1.99 hours. What was his average speed in mph?

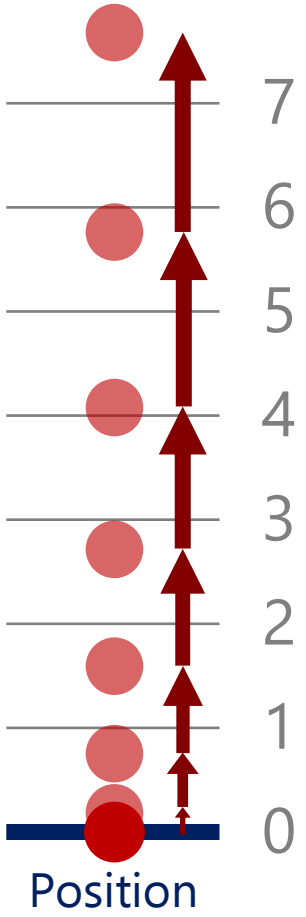
$$v = \frac{d}{t}$$

Average vs Instantaneous



An object speeding up (positive)





The power of the slope!

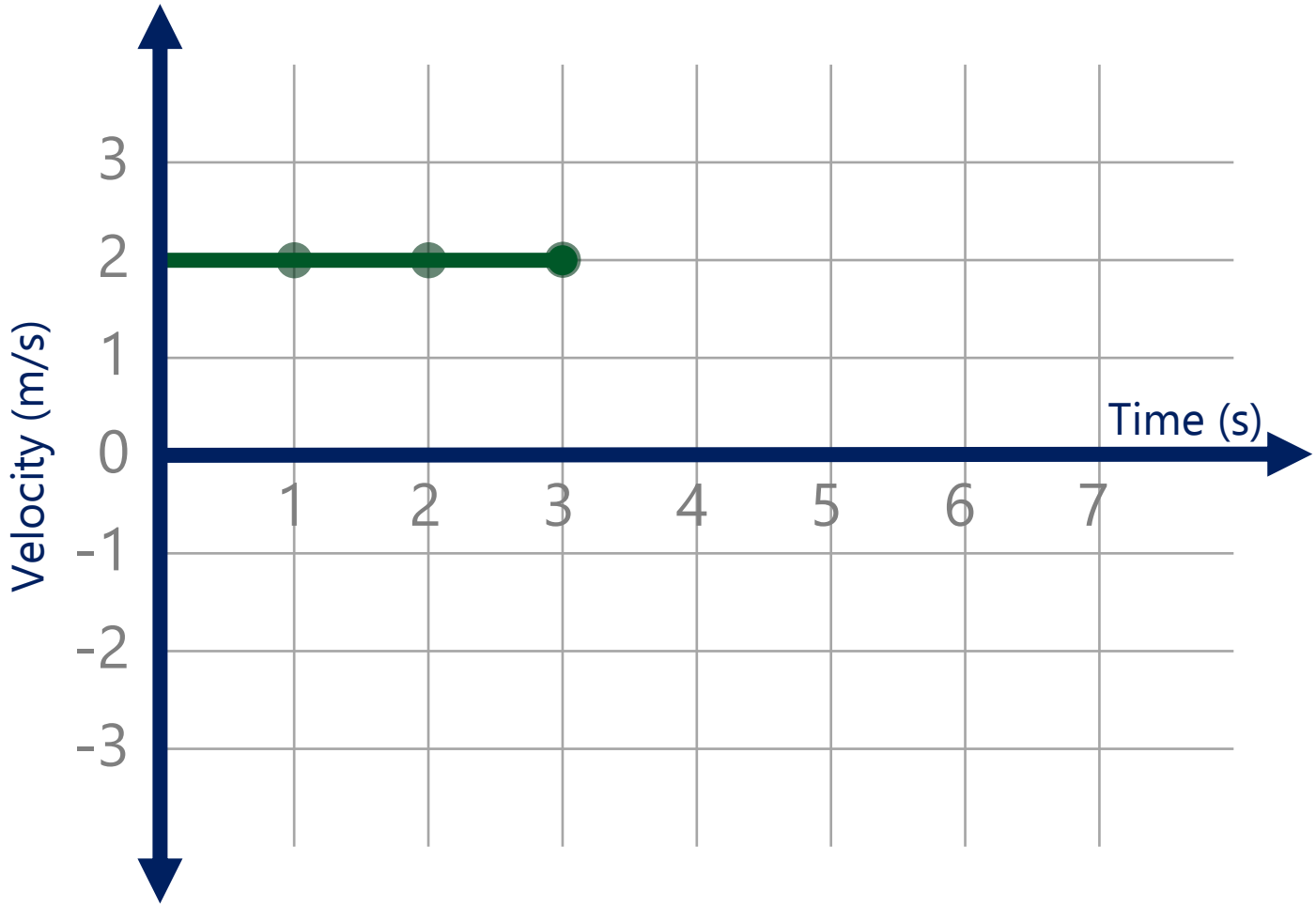
Slope

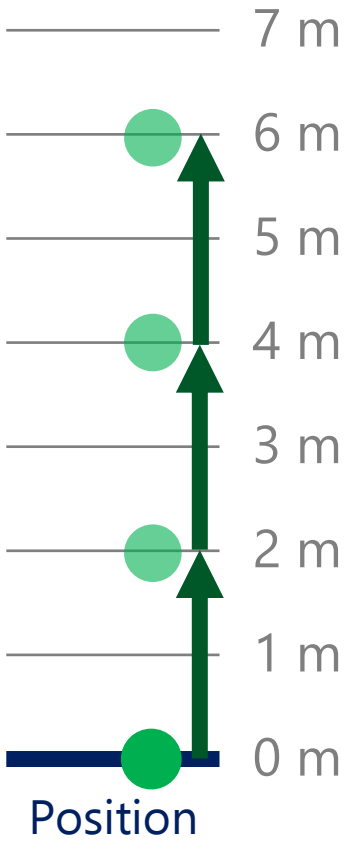
Displacement vs Time

Slope

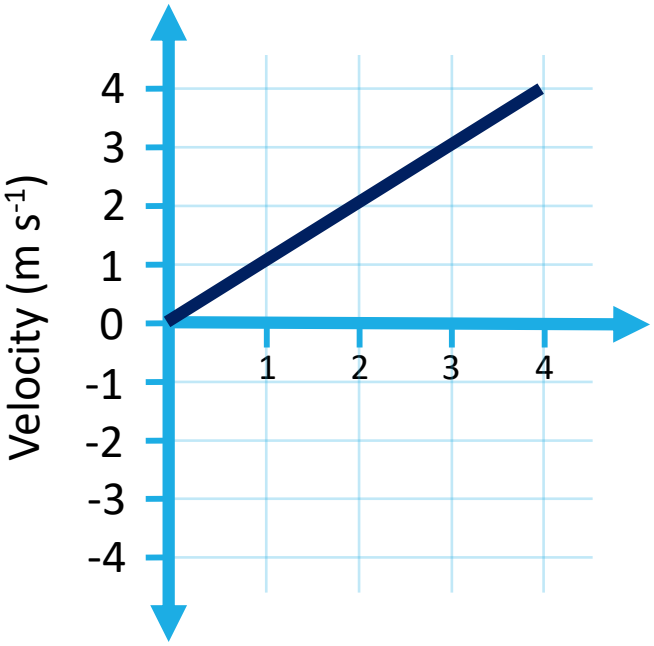
Velocity vs Time

Calculating Displacement





Information from a V vs T graph

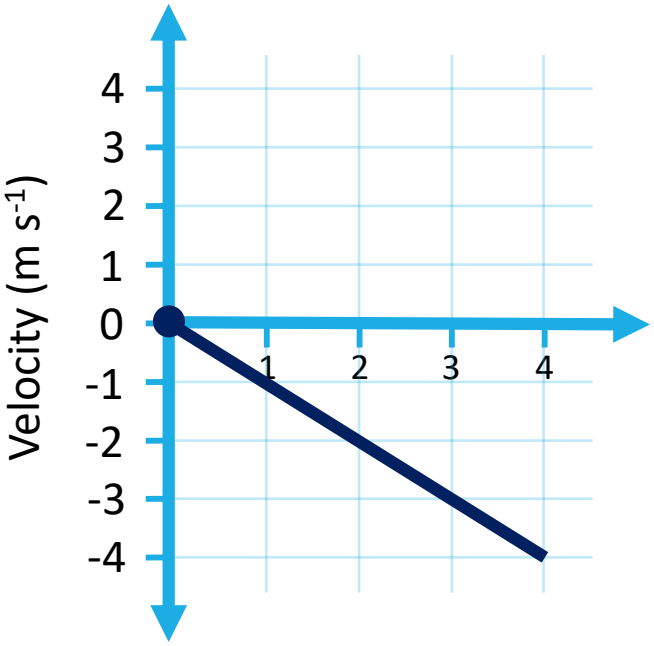


What is the velocity at 4 seconds?

What is the acceleration from 1 s – 4 s?

What is the displacement after 4 s?

Information from a V vs T graph

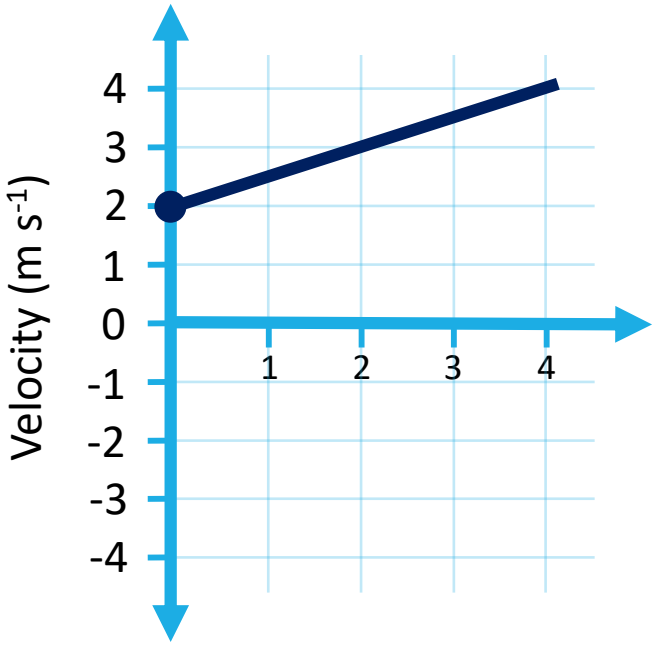


What is the velocity at 4 seconds?

What is the acceleration from 0 s – 4 s?

What is the displacement after 4 s?

Information from a V vs T graph



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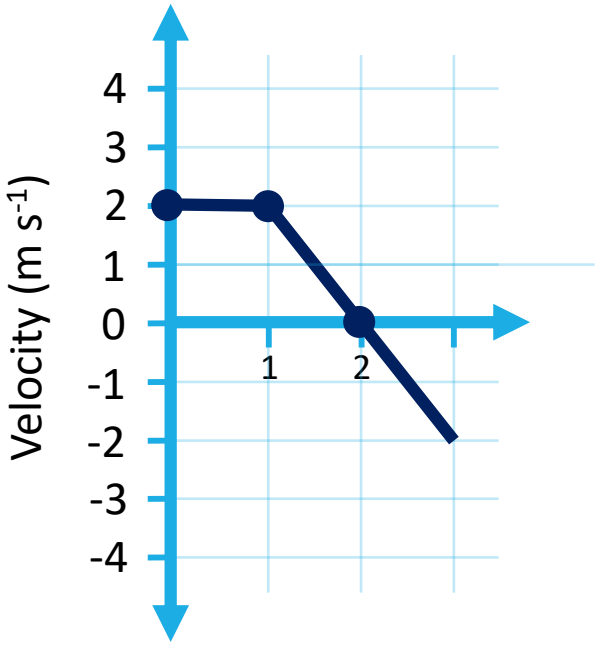
What is the displacement after 4 s?

Information from a V vs T graph

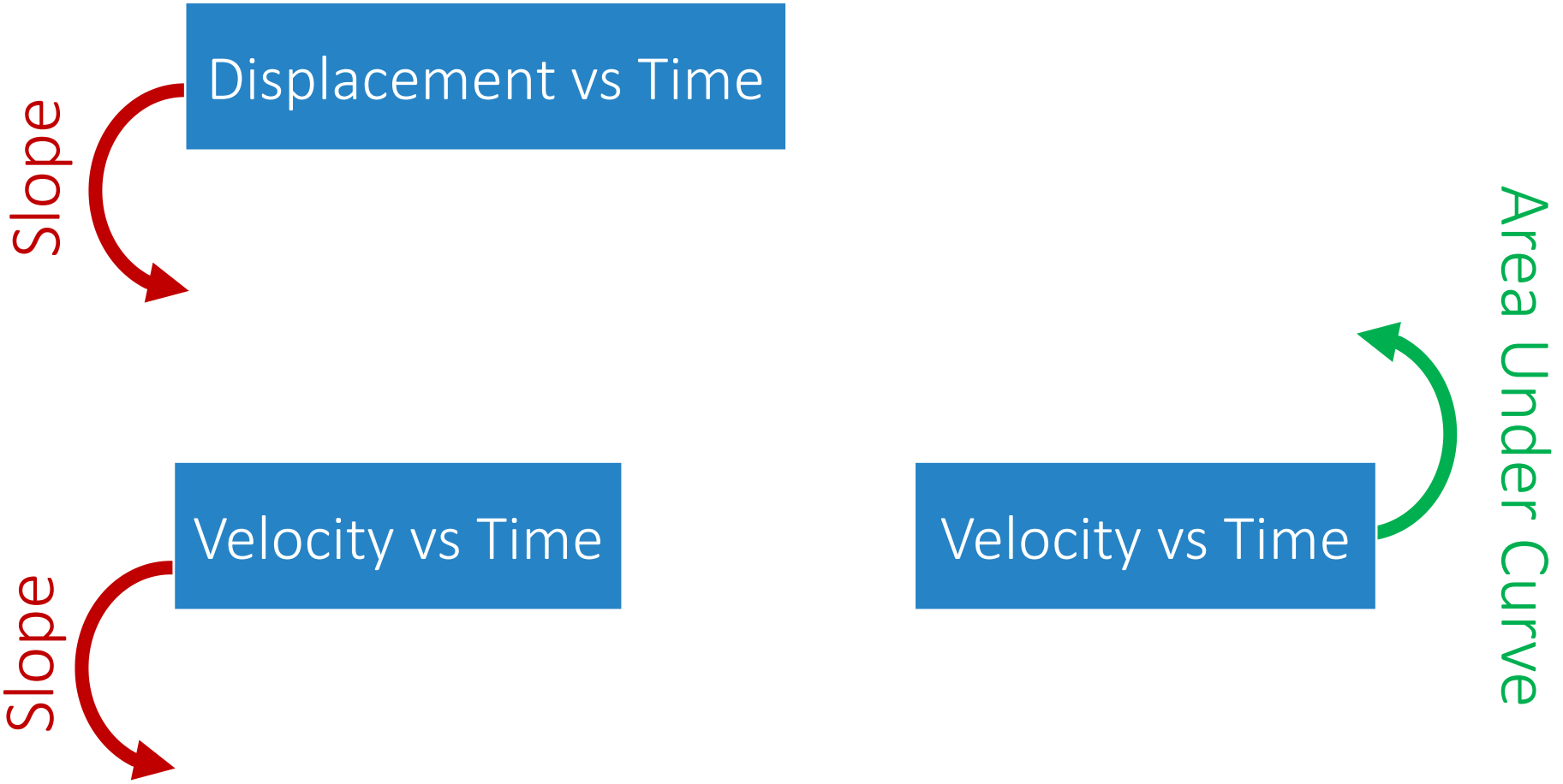


What is the velocity at 3 seconds?

What is the acceleration from 1 s – 3 s?

What is the displacement after 3 s?

Use the graphs to tell you MORE!



Lesson Takeaways

- ❑ I can use an equation to calculate average speed/velocity
- ❑ I can calculate instantaneous velocity using the slope of a displacement vs time graph
- ❑ I can calculate instantaneous acceleration using the slope of a velocity vs time graph
- ❑ I can calculate overall displacement using the area of a velocity vs time graph