

Big Ideas

- Measurement devices are inherently uncertain, and measurement precision / uncertainty can be communicated
- The shape of a graph can lead to valuable information to gain new insights or useful models

1 – Measurements

I can describe the difference between quantitative and qualitative measurements			
I can list the 7 fundamental SI units			
I can define precision and accuracy			
I can calculate absolute, fractional, and percent uncertainty for digital and analog measurements			
I can determine the number of significant digits in a measurement			

2 – Displacement Graphs

I can describe the difference between distance and displacement			
I can calculate distance and displacement for 1D motion			
I can plot constant velocity on a displacement vs time graph			
I can plot changing velocity on a displacement vs time graph			
I can use a displacement 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			

3 – Velocity Graphs

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			

4 – Graphing Calculations

I can use a mathematical model to make a prediction			
I can determine the equation, values, and units for the slope of a graph			
I can determine the equation, values, and units for the area of a graph			
I can identify strategies to calculate displacement, velocity, and acceleration from a graph			

5 – Unit Analysis

I can represent fractional units with negative exponents			
I can use dimensional analysis to determine unknown units from an equation			
I can convert units using dimensional analysis (including squared and cubed units)			

6 – Uncertainty Calculations

I can calculate uncertainty from added or subtracted values			
I can calculate uncertainty from multiplied or divided values			

Fundamental SI Units

	Unit	Abbreviation
Length		
Mass		
Time		
Electric Current		
Temperature		
Amount of Substance		
Luminous Intensity		

Error and Measurements

Precision	Accuracy

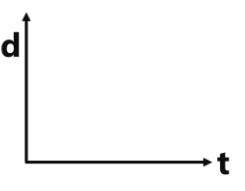
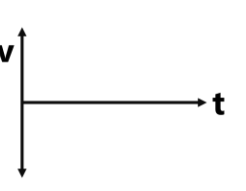
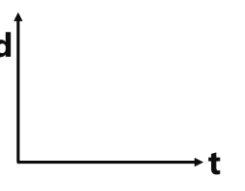
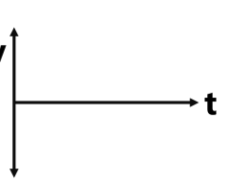
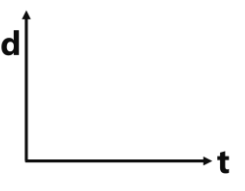
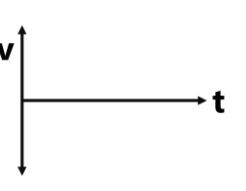
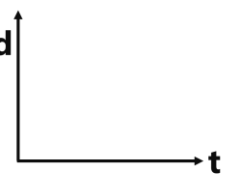
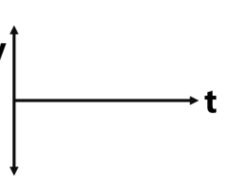
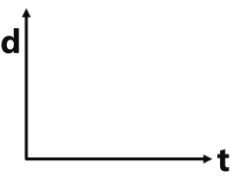
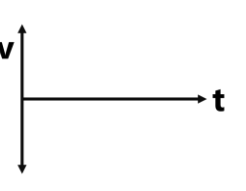
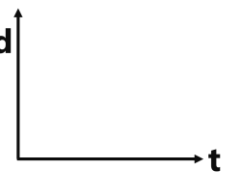
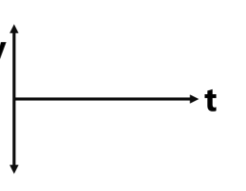
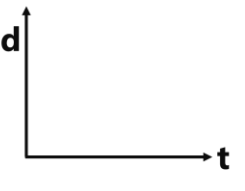
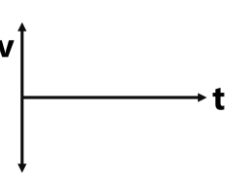
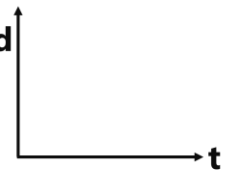
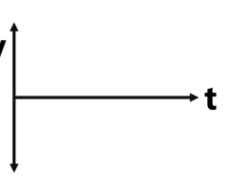
Random Error	Systematic Error

	Measurement Precision	Measurement Uncertainty
Analog		
Digital		

Motion Definitions

	Scalar	Vector
How far (m)		
How fast (m s^{-1})		

Motion Graphs

	Positive Direction		Negative Direction	
	Displacement	Velocity	Displacement	Velocity
Not Moving				
Constant Velocity				
Speeding Up				
Slowing Down				

Uncertainty Calculations

	<i>Data Booklet Equations:</i>	
Absolute Uncertainty:	If: $y = a \pm b$	
Fractional Uncertainty:	Then: $\Delta y = \Delta a + \Delta b$	
Percentage Uncertainty:	If: $y = \frac{ab}{c}$	
	Then: $\frac{\Delta y}{y} = \frac{\Delta a}{a} + \frac{\Delta b}{b} + \frac{\Delta c}{c}$	