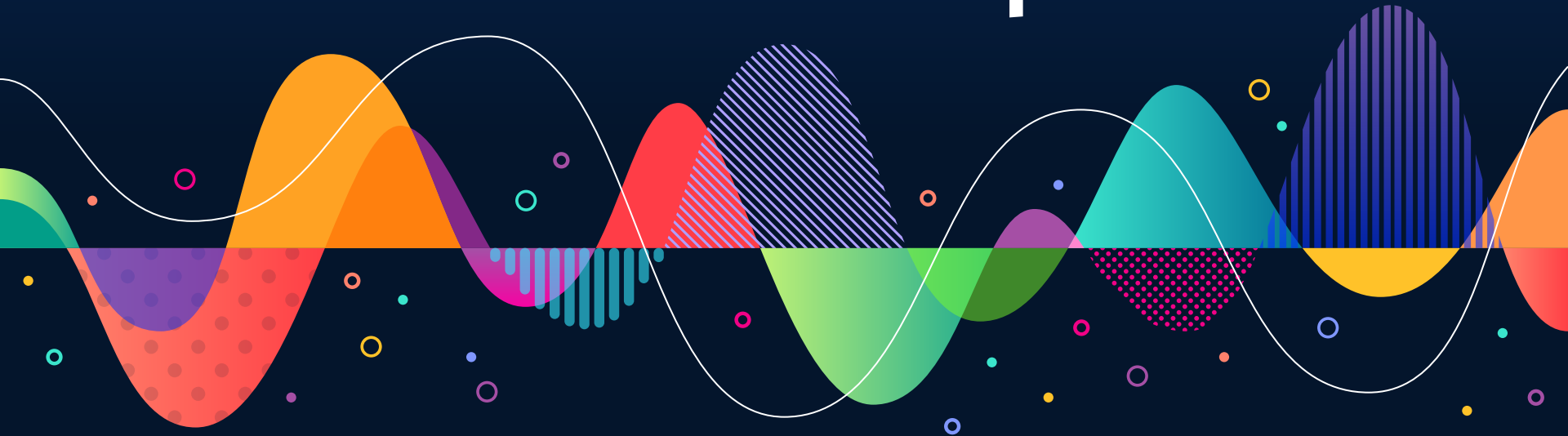


PHYS211

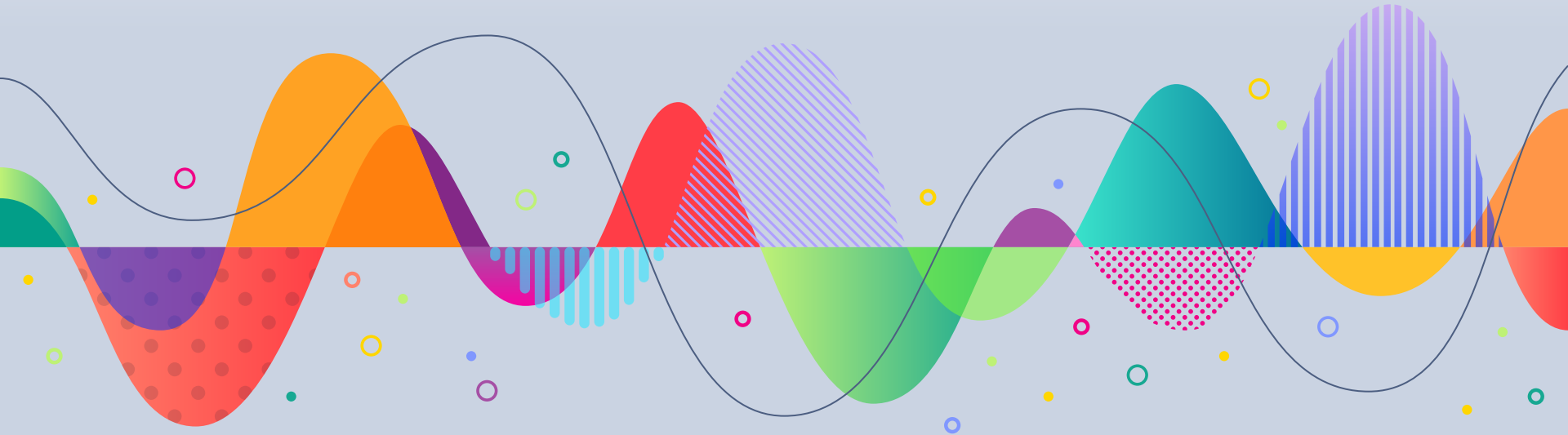
Exam 1 Prep



1.

Overview

Quick bits of info to know

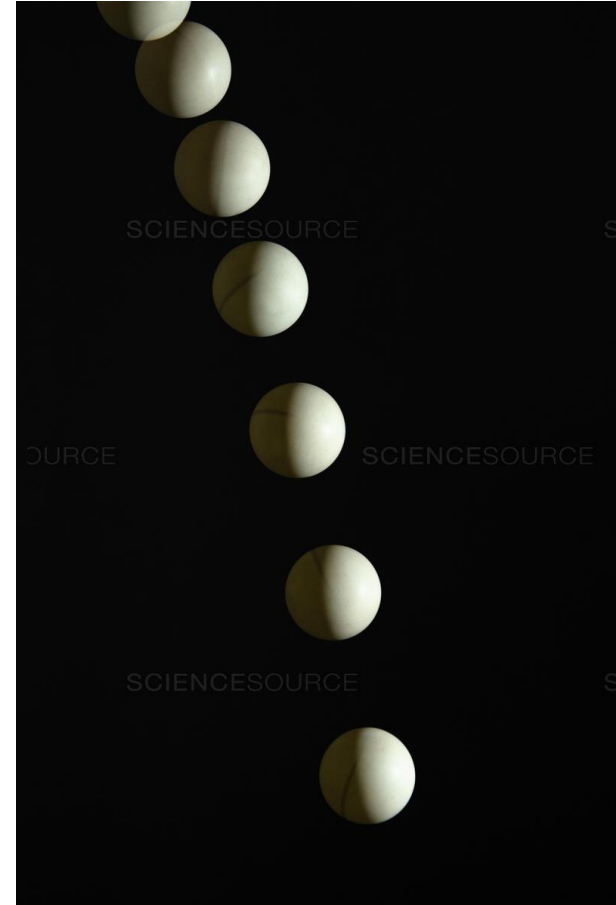


Newton's Laws

- 1st Law: Velocity of an object is constant if the sum of forces on the object is zero, $\mathbf{F}=0 \Leftrightarrow dv/dt=0 \Leftrightarrow \mathbf{a}=0$ (Inertia)
- 2nd Law: The net force on an object is equal to its mass times its acceleration, $\mathbf{F}=\mathbf{ma}$
- 3rd Law: Any forces acting on an object will have an equal and opposite reaction, $\mathbf{F}_{a,b} = -\mathbf{F}_{b,a}$
- These equations are true for all interactions in Phys 211! Note that the forces and acceleration are vectors; direction matters.

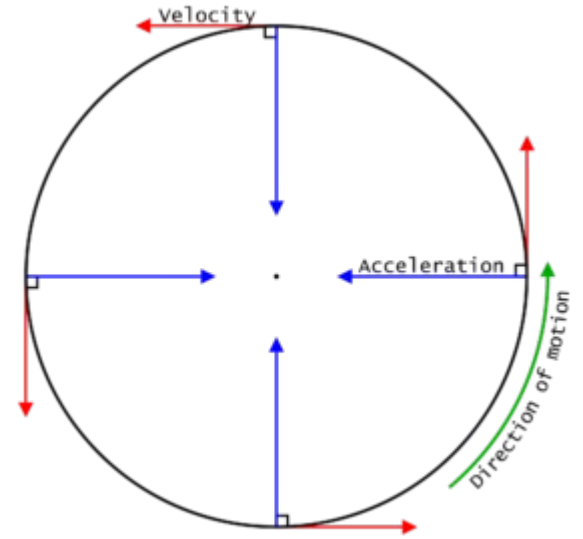
1-D, 2-D Kinematics

- Equations associated with Kinematics:
 - $\mathbf{v} = \mathbf{v}_0 + \mathbf{a}t$
 - $\mathbf{r} = \mathbf{r}_0 + \mathbf{v}_0t + \frac{1}{2} \mathbf{a} t^2$
 - $v^2 = v_0^2 + 2 \mathbf{a} (x - x_0)$



Relative, Circular Motion

- The Centrifugal force is a fictitious force, meaning that it is a result of other forces acting on a system to make it go in circular motion
- Centripetal acceleration, for circular motion, is always radially inwards and the velocity is tangential to the path.



Kinematics

▷ Projectile Motion

- ▶ X direction: v is constant, $a = 0$
- ▶ Y direction: v at top = 0, $a = g$
- ▶ Remember, time is the same in both x/y
- ▶ Break up velocity into components if needed



▷ Circular Motion

- ▶ Acceleration always points inward
- ▶ $v = wr$ (and is tangential to path)
- ▶ Direction of individual forces can be different at different positions of the circle

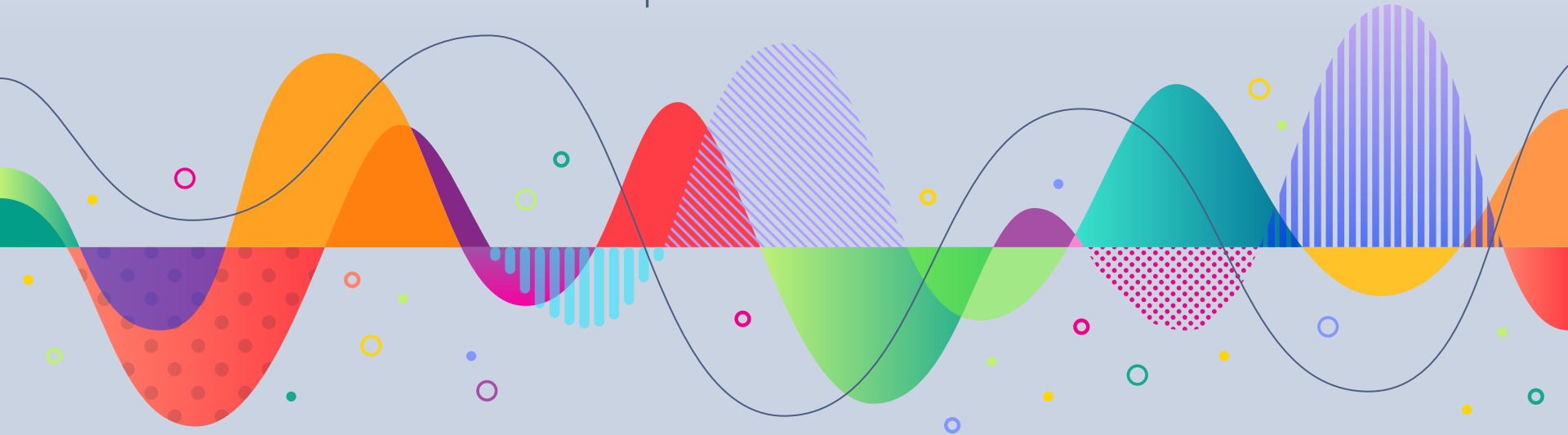
Forces

- ▷ Conservative
 - ▶ Weight (gravity)
 - ▶ Spring Force: $F_s = -k \Delta x$
 - ▶ Potential Energy diff
- ▷ Equal & Opposite Forces
- ▷ X and Y components still apply, especially for ramp problems
- ▷ Free Body Diagrams:
 - ▶ The net force is NOT drawn on the free body diagram
 - ▶ Only draw external forces acting on the object
- ▷ Nonconservative
 - ▶ Normal: Perpendicular to an object's surface by below surface
 - ▶ Tension: points away from object
 - ▶ Friction: $f = \mu N$, opposes motion

2.

Problem Solving

Some Steps to Follow If You're Lost

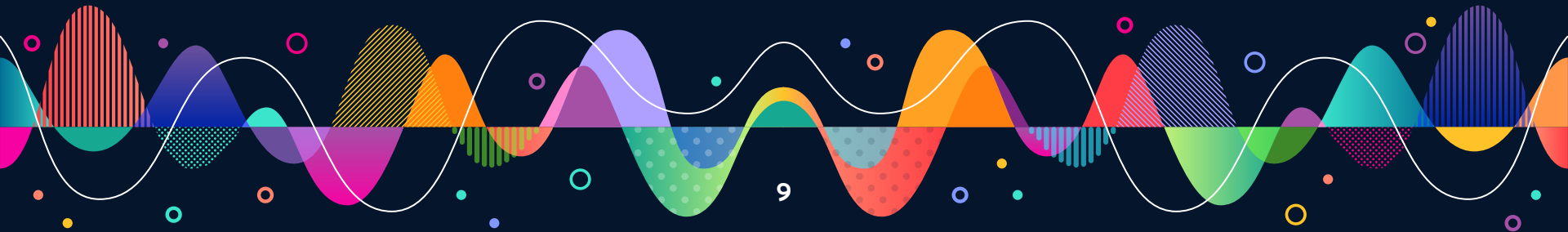


Kinematics



How to Identify:

- Projectile Motion
- Given $v/x/a$
- Relative Motion



Kinematics



- ▷ List given variables
 - ▶ In both x and y directions
- ▷ Match up to kinematics equations on eqn sheet
- ▷ Remember to watch out for Relative Motion

Forces



How to Identify:

- Springs
- Mass Sliding
- Ramps
- Strings

Forces



- ▷ ALWAYS start with Free Body Diagrams
- ▷ Write $F=ma$ equations
 - ▶ In both x and y directions
 - ▶ Pay close attention to the SIGNS of your variables!
- ▷ Solve for the variable you're looking for

Worksheet Time!



Enter Queue with your name and net ID:

By entering the queue, you help us:

- Reserve a big enough space at the next review session

- Assign enough tutors for everyone to have access to help

Thank you!

