



# Year 12 Physics Teacher A Learning Journey Map

YEAR 13

Simple Harmonic Systems

RP 7: Investigation into simple harmonic motion using a mass-spring system and a simple pendulum

Forced Vibrations and Resonance

Simple Harmonic Motion

Circular Motion

Further Mechanics

**Further Mechanics - Maths Skills:**

- Estimate results
- Draw and use the slope of a tangent to a curve as a measure of rate of change
- Understand the possible physical significance of the area between a curve and the x-axis, and be able to calculate it or estimate it by graphical methods as appropriate
- Sketch relationships which are modelled by  $y = k/x$ ,  $y = kx^2$ ,  $y = k/x^2$ ,  $y = \sin(x)$ ,  $y = \cos(x)$ ,  $y = e^{+x}$  and  $y = \sin^2(x)$ ,  $y = \cos^2(x)$  as applied to physical relationships
- Use of small angle approximations, including  $\sin(\theta) \approx \theta$ ,  $\cos(\theta) \approx 1$  and  $\tan(\theta) \approx \theta$  for small where appropriate

**Materials – Working Scientifically:**

- Consider margins of error, accuracy and precision of data
- Know and understand how to use a wide range of experimental and practical instruments, equipment and techniques

**Materials - Maths Skills:**

- Recognise and use expressions in decimal and standard form
- Calculate areas of triangles, circumferences and areas of circles, surfaces areas and volumes of rectangular blocks, cylinders and spheres
- Estimate results
- Translate information between graphical, numerical and algebraic forms

PPEs

The Young Modulus

Force-Extension Graphs

RP 4: Determination of the Young Modulus by a simple method

Hooke's Law  
Elastic limits

Density

Materials

Work, Energy and Power

Projectile Motion

AP 2

**Mechanics - Working Scientifically:**

- Solve problems set in practical contexts
- Plot and interpret graphs
- Present data in appropriate ways
- Know and understand how to use a wide range of experimental and practical instruments, equipment and techniques
- Consider margins of error, accuracy and precision of data

Conservation of Energy

Momentum

Moments

RP 3: Determination of g by a freefall method

**Mechanics - Maths Skills:**

- Use calculators to handle trigonometric functions (e.g.  $\sin(x)$ ) where x may be expressed in degrees or radians
- Use sin, cos and tan in physical problems
- Visualise and represent 2D and 3D forms including 2D representations of 3D objects
- Use Pythagoras' theorem, and the angle sum of a triangle
- Calculate rate of change from a graph showing a linear relationship, or using a tangent to a curve.
- Distinguish between instantaneous rate of change and average rate of change
- Use calculators to find and use power, exponential and logarithmic functions
- Change the subject of an equation, including non-linear equations
- Substitute numerical values into algebraic equations using appropriate units for physical quantities to solve them
- Use ratios, fractions and percentages
- Find arithmetic means
- Apply concepts underlying calculus (without explicit use of derivatives or integrals) by solving equations involving rates of change
- Plot two variables from experimental or other data
- Use angles in regular 2D and 3D structures
- Estimate results

Mechanics

Scalars and Vectors

Motion along a straight line

Induction Assessment

Wave-Particle duality

AP 1

Photon emission

Photoelectric effect

Conservation Laws

Quarks

Alpha and beta decay

YEAR 12

Energy Levels

Particle Interactions

Particle classification

Particles, antiparticles and photons

Particles and Radiation

**Particles and Radiation - Maths Skills:**

- Substitute numerical values into algebraic equations using appropriate units for physics quantities
- Recognise and make use of appropriate units in calculations
- Recognise and use expressions in decimal and standard form
- Use an appropriate number of significant figures
- Substitute numerical values into algebraic equations using appropriate units for physical quantities.
- Change the subject of equations, including non-linear equations

**Particles and Radiation - Working Scientifically:**

- Apply scientific knowledge to practical contexts
- Process and analyse data using appropriate mathematical skills