MECHANICS

PHYSICS LEVEL 2

Study Checklist

If you've picked up this checklist, congrats! You've begun the first step in a system of resources designed to help you through the Mechanics external. To make the most of this, we suggest you sit down, grab a pen, and mark any points that you're feeling a little unsure of. Then, create a subject audit using our template, or refer to the page numbers to find the section in our walkthrough guide to help you out!

BASICS

- ☐ I can describe the sides of a triangle using words such as 'hypotenuse', 'adjacent' and 'opposite' [TBC]
- ☐ I can use trigonometry to calculate the side lengths of, and angles within a triangle [TBC]
- ☐ I can describe what the length of an arrow tells us about the value of a vector [TBC]
- ☐ I can define the horizontal and vertical components of a vector [TBC]
- ☐ I can write numbers in scientific notation [TBC]

FORCES

- ☐ I can define the term 'force' [TBC]
- ☐ I can define all three of Newton's laws of physics, and how they relate to forces [TBC]
- ☐ I can explain the difference between 'mass' and 'weight' [TBC]
- ☐ I can describe how the weight of an object is linked to gravity [TBC]
- ☐ I can describe what a 'reaction force' is [TBC]
- ☐ I can define and give examples of 'friction' and 'tension' forces [TBC]
- ☐ I can define the term 'equilibrium' in relation to forces [TBC]
- ☐ I can draw a force diagram using a number of different forces [TBC]
- ☐ I can define the ideas of 'net force' and 'balanced forces', and link them to the concept of acceleration [TBC]
- ☐ I can calculate the force (F), mass (m), or acceleration using the equation: F_net=ma. [TBC]
- ☐ I can compare the effect of balanced and unbalanced forces on the direction, velocity and acceleration of the object.

KINEMATICS

- ☐ I can state the symbols AND units of: velocity, distance, time, and acceleration. [TBC]
- ☐ I can calculate velocity (v), acceleration (a), distance (d), or time (t), using the appropriate motion formula. [TBC]
- ☐ I can identify and use the four kinematic equations to calculate distance, time, initial velocity and final velocity [TBC]

PROJECTILE MOTION

- ☐ I can draw or describe the general path of projectile motion, describing the shape it forms. [TBC]
- ☐ I can link the motion of a projectile to the force acting on it [TBC]
- ☐ I understand that the horizontal velocity remains the same during a projectile motion [TBC]
- ☐ I can describe the size of both the horizontal and vertical velocity components at the starting point, the highest point, and at the end point of a projectile motion [TBC]
- ☐ I can explain why the vertical velocity changes throughout the journey, while the horizontal velocity remains the same throughout a projectile motion [TBC]
- ☐ I can calculate the initial vertical velocity (v_v), the initial horizontal velocity (v_h) and the initial velocity (v_i) of a projectile, using either Pythagoras' Theorem ($a^2 + b^2 = c^2$) or trigonometry. [TBC]
- ☐ I can calculate the time it takes for the vertical velocity to reach zero. [TBC]
- ☐ I can calculate the height of the highest point in the projectile path [TBC]
- ☐ I can calculate the total journey time from the vertical velocity. [TBC]
- ☐ I can calculate the total horizontal distance of the projectile motion path. [TBC]
- ☐ I can calculate the position of the projectile at any time point in its motion. [TBC]

CIRCULAR MOTION

- ☐ I can define "centripetal force". [TBC]
- ☐ I can explain how an object can travel at a constant speed during its circular motion while also accelerating. [TBC]
- ☐ I can draw and label a diagram of the circular motion of an object, showing the direction of the centripetal force and the velocity [TBC]
- ☐ I understand that the velocity of the object is at 90°, or tangential, to the centripetal force. [TBC]
- ☐ I can calculate the centripetal acceleration (a_c), velocity (v), or radius (r) using the equation: $a_c=v^2/r$. [TBC]
- ☐ I can calculate the centripetal force (F_c), mass (m), velocity (v), or radius (r) using the equation: $F_c=(mv^2)/r$. [TBC]

TORQUE

- ☐ I can define torque. [TBC]
- ☐ I can calculate the torque (τ), force (F), or distance from the pivot point (d) using the equation: $\tau=Fd$ [TBC]
- ☐ I understand the concept of equilibrium, where upwards forces equal downwards forces, and clockwise torques equal anti-clockwise torques. [TBC]
- ☐ I can explain the relationship between torque and both the size of the force and the distance from the pivot point. [TBC]
- ☐ I can calculate the force required to bring objects around pivot points to equilibrium. [TBC]
- ☐ I can use upwards/downwards forces and clockwise/anticlockwise torques to calculate the support forces in a real-word context, such as a bridge. [TBC]

AVERAGE SPEED

MOMENTUM

- ☐ I can state the symbols AND units of: momentum, force, time, energy, mass, velocity, acceleration due to gravity, work, distance, and power. *[TBC]*
- ☐ I can describe momentum, and can calculate its value using the equation: p=mv. *[TBC]*
- ☐ I understand that momentum is conserved in a collision. *[TBC]*
- ☐ I can calculate the total momentum before and the total momentum after a collision. *[TBC]*
- ☐ I can define the difference between an elastic and inelastic collision *[TBC]*
- ☐ I can define the term 'impulse' and calculate it *[TBC]*
- ☐ I can discuss how the impulse equation is useful investigating the damage from a collision *[TBC]*

ENERGY

- ☐ I can calculate kinetic energy (E_k), mass (m), or velocity (v) using the equation: $E_k = 1/2\ mv^2$ *[TBC]*
- ☐ I can calculate gravitational potential energy (E_p), mass (m), or height (h) using the equation: $E_p = mg\Delta h$. *[TBC]*
- ☐ I can calculate the potential energy stored in the spring using the equation: $E_p = 1/2\ kx^2$ *[TBC]*
- ☐ I can explain 'Hooke's Law' *[TBC]*
- ☐ I can explain why energy may be lost when converted from potential energy to kinetic energy, and can explain which forms of energy this 'lost energy' has been converted into *[TBC]*
- ☐ I can define (in my own words) both kinetic energy and gravitational potential energy. *[TBC]*
- ☐ I can define work.
- ☐ I can calculate work (W), force (F) or distance travelled (d) using the equation: W=Fd *[TBC]*
- ☐ I can define power.
- ☐ I can calculate power (P) using the equation: P=W/t *[TBC]*