PHYA2 3.2.1

Mechanics

AS Physics:

what you need to know

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Scalars and vectors** | I can do this already | Covered in class | Strength | Weakness | I have  revised this | Book references |
| I can explain what is meant by a **scalar** quantity and give examples. |  |  |  |  |  | AQA: 90  APfY: 10 |
| I can explain what is meant by a **vector** quantity and give examples. |  |  |  |  |  | AQA: 90  APfY: 10 |
| I can draw and use a vector triangle (scale diagram or sketch) to determine the **resultant** of two vectors in the same plane (e.g. displacement, velocity and force). |  |  |  |  |  | AQA: 90 & 91 |
| I can calculate the **resultant** of two vectors at right angles to each other (e.g. displacement, velocity and force). |  |  |  |  |  | AQA: 91 & 92  APfY: 12 |
| I can **resolve** a vector such as displacement, velocity and force into two perpendicular components. |  |  |  |  |  | AQA: 92 & 93  APfY: 14 |
| I can resolve a vector into components that are along and parallel to an inclined plane. |  |  |  |  |  | AQA: 95 & 104 |
| I can explain what is meant when two or three forces acting at a point are said to be in **equilibrium**. |  |  |  |  |  | AQA: 94  APfY: 26 |
| I can draw and use a **triangle of forces** to represent the equilibrium of three forces acting at a point in an object. |  |  |  |  |  | .  AQA: 104 & 105 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Moments** | | | | | | |
| I can explain the meaning ofthe**moment of a force**and calculate its value in problems. |  |  |  |  |  | AQA: 97  APfY: 27 |
| I can explain that a **couple** is a pair of forces that tends to produce rotation only. |  |  |  |  |  | AQA: 100  APfY: 27 |
| I can explain the meaning of the**torque** of a coupleand calculate its value in problems. |  |  |  |  |  | AQA: 100  APfY: 27 |
| I can explain that when an object is in equilibrium both the **net force** and **net moment** are **zero**. |  |  |  |  |  | AQA: 106  APfY: 26 |
| I can state the **principle of moments** and use it to solve problems. |  |  |  |  |  | AQA: 97 - 100  APfY: 28 |
| I can explain what is meant by the **centre of mass**of an object. |  |  |  |  |  | AQA: 98  APfY: 29 |
|  |  |  |  |  |  |  |
| **Motion along a straight line** | | | | | | |
| I can define **displacement**, **instantaneous speed**, **average speed**, **velocity** and **acceleration**. |  |  |  |  |  | AQA: 90, 112 & 114  APfY: 32 & 33 |
| I can use **graphs** to show displacement, speed, velocity and acceleration vs time. |  |  |  |  |  | AQA: 113 & 122  APfY: 34 |
| I can find **velocity** from the **gradient** of a **displacement** - **time graph**. |  |  |  |  |  | AQA: 113  APfY: 34 |
| I can find **acceleration** from the **gradient** of a **velocity** - **time graph**. |  |  |  |  |  | AQA: 115  APfY: 34 |
| I can determine **displacement** from a **velocity – time graph**. |  |  |  |  |  | AQA: 122  APfY: 35 |
|  |  |  |  |  |  |  |
| **Motion along a straight line** continued | I can do this already | Covered in class | Strength | Weakness | I have  revised this | Book references |
| I can select and use the equations of motion for constant acceleration in a straight line: , , and **22** |  |  |  |  |  | AQA: 114 – 116; 124 & 125  APfY: 36 |
| I can apply the equations of motion for constant acceleration in a straight line, including the motion of bodies falling in the Earth’s uniform gravitational field without air resistance. |  |  |  |  |  | AQA: 119 - 121  APfY: 38 |
| I can define **terminal speed** and explain it in terms of the forces acting on a falling body. |  |  |  |  |  | AQA: 138 & 139  APfY: 39 |
|  |  |  |  |  |  |  |
| **Projectile motion** | | | | | | |
| I can define the term **projectile**. |  |  |  |  |  | AQA: 126  APfY: 40 |
| I can apply the equations of motion for constant acceleration to describe and explain the motion of an object to a uniform velocity in one direction and a constant acceleration in a perpendicular direction. |  |  |  |  |  | AQA: 126 - 129  APfY: 126 |
|  |  |  |  |  |  |  |
| **Newton’s laws of motion** | | | | | | |
| I can state and use each of Newton’s three laws of motion. |  |  |  |  |  | AQA: 132,  APfY: 45 - 49 |
| I understand the condition under which Newton’s second law can be given as . |  |  |  |  |  | AQA: 135 - 137  APfY: 47 |
|  |  |  |  |  |  |  |
| **Work, energy and power; conservation of energy** | | | | | | |
| I can define the **work done by a force**. |  |  |  |  |  | AQA: 148  APfY: 60 |
| I can calculate work done using , where θ is the angle between the applied force and direction of motion. |  |  |  |  |  | AQA: 149  APfY: 60 |
| I understand that **when work is done energy is transferred**. |  |  |  |  |  |  |
| I can define *power* as **the rate at which work is done** (or the rate at which energy is transferred). |  |  |  |  |  | AQA: 153  APfY: 61 |
| I can calculate power using |  |  |  |  |  | AQA: 153  APfY: 61 |
| I can explain why is equivalent to |  |  |  |  |  | AQA: 153  APfY: 61 |
| I can define efficiency as |  |  |  |  |  | AQA: 155  APfY: 65 |
| I can recall and use the equation for **kinetic energy**. |  |  |  |  |  | AQA: 151  APfY: 62 |
| I can recall and use the equation for **gravitational potential energy**. |  |  |  |  |  | AQA: 151  APfY: 62 |
| I can state the **principle of conservation of energy**. |  |  |  |  |  | AQA: 148  APfY: 64 |
| I can apply the principle of conservation of energy to problems involving the transfer of kinetic and gravitational potential energies, and to those involving work done against resistive forces (e.g. friction). |  |  |  |  |  | AQA: 151 & 152  APfY: 63 |

**Book references:**

AQA = ***AQA Physics A*** by Breithaupt (Pub. Nelson Thornes) – the AQA endorsed textbook

APfY =***Advanced physics*** *for you* by Johnson, Hewett, Holt and Miller (Pub. Nelson Thornes)