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**Knowledge Rich Curriculum Plan**

SCIENCE- Physics Year 11

| **Lesson/Learning Sequence**  | **Intended Knowledge:***Students will know that…* | **Prior Knowledge:***In order to know this, students need to already know that…* | **Working Scientifically** | **Tiered Vocabulary and Reading Activity** |
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| **Lesson:** **Scalar and Vector Quantities** | * Students will know that scalar quantities have magnitude only
* Students will know that vector quantities have magnitude and direction
* Students will know how to represent vectors using diagrams
* Students will know how to determine whether a quantity is a scalar or vector quantity
 | * ***Students need to already know that quantities can be represented using arrows***
 |  | Tier 2Magnitude: sizeTier 3Scalar: Quantity with magnitude onlyVector: Quantity with size and direction |
| **Lesson:** **Distance and Displacement** | * Students will know that distance doesn’t involve direction
* Students will know that distance is how far an object moves
* Students will know that displacement includes both the distance an object moves (as a straight line from start to end) and the direction
* Students will know how to express displacement as both magnitude and direction
 | ***Students need to already know that scalar quantities are quantities with magnitude only***Students need to already know that vector quantities are quantities with magnitude and direction | Interpreting scale diagrams | Tier 2Tier 3 |
| **Lesson:** **Speed** | * Students will know that speed is a scalar quantity as it doesn’t involve direction
* Students will know that the speed of moving objects is rarely constant
* Students will know that typical walking speed is 1.5 m/s
* Students will know that typical running speed is 3 m/s
* Students will know that typical cycling speed is 6 m/s
* Students will know that typical value for speed of sound in air is 330 m/s
* Students will know how to make measurements of distance and time and calculate speed of objects
* Students will know how to use the speed equation to calculate speed, distance and time
 | ***Students need to already know that scalar quantities are quantities with magnitude only***Students need to already know that vector quantities are quantities with magnitude and direction | EstimationsTaking measurements of distance and time | Tier 2Uniform: Remaining the same at all timesTier 3 |
| **Lesson:** **Velocity** | * Students will know that velocity of an object is its speed in a given direction
* Students will know how to explain why velocity is a vector quantity
* Students will know that an object travelling in circular motion at constant speed has changing velocity as its direction is changing
 | ***Students need to already know that scalar quantities are quantities with magnitude only***Students need to already know that vector quantities are quantities with magnitude and direction |  | Tier 2Tier 3 |
| **Lesson:** **Distance-time graphs** | * Students will know that distance-time graphs can be used to represent the motion of an object in a straight line.
* Students will know that the speed of an object can be calculated from the gradient of the distance time graph
* Students will know that an accelerating object will have a curved line, and the speed at a particular point can be calculated by drawing a tangent and measuring the gradient
* Students will know how to draw distance time graphs from measurements
* Students will know how to interpret distance time graphs
 | * ***Students need to already know that speed is a measure of how fast an object is moving***
 | Interpreting graphsDetermining gradients from graphs | Tier 2Gradient: a measure of how steep a slope isTier 3 |
| **Lesson:** **Acceleration** | * Students will know that acceleration is a measure of the rate of change of velocity
* Students will know that the unit of acceleration is m/s2
* Students will know that an object slowing down is decelerating, and that this is negative acceleration
* Students will know that acceleration is calculated using acceleration = change in velocity / time taken
* Students will know how to calculate acceleration using both the acceleration equation and the uniform acceleration equation found in the data sheet.
 | * ***Students need to already know velocity is a vector quantity***
 |  | Tier 2Tier 3Acceleration: the rate of change in velocity |
| **Lesson: Velocity-time graphs** | * Students will know that velocity time graphs can be used to represent the motion of an object
* Students will know that the acceleration of an object can be calculated from the gradient of a velocity-time graph
* Students will know that the distance travelled by an object can be calculated from the area under a velocity-time graph
* Students will know how to draw velocity-time graphs
* Students will know how to interpret velocity-time graphs
 | ***Students need to already know that acceleration is the rate of change in velocity***Students need to already know that velocity is a vector quantity | Drawing GraphsInterpreting GraphsCalculating gradients | Tier 2Tier 3 |