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| **TITLE:** |  | | **DURATION:** |
| DC MOTORS | | | 20 mins |
| **OBJECTIVES:** | | **RESOURCES REQUIRED** | |
| * Apply knowledge about how the Arduino works by powering a device * Demonstrate understanding of how to change motor speed and direction | | * PowerPoint * Arduino * USB-B Cable * 1x DC Motor | |
| **SECTION** | **POINTS TO COVER** | | |
| **Introduction:** | * Enthuse cadets and tell them that we will make motors turn * We will learn new skills which will make our robots move | | |
| **Main:** | * Describe how a DC Motor works   + Takes DC power (same as what comes from Arduino)   + Power an electro-magnet, this magnetic field rotates a magnet inside   + The turning of the magnet switches the direction of the electromagnet   + This changing direction generates spin! * Identify the two jumper wires on the motor:   + RED – Power (+, Vcc)   + BLK – Ground (-, GND) * Get cadets to power their motors, first ask them to unplug their Arduinos from their Laptops * Advice:   + When plugging in cables be careful   + Do not use excessive force, the pin and Arduino are easily broken   + If the pin does not easily push into the Arduino, rotate the wire until it does   + Once the Jumper wires are inserted, do not bend the end of the pins within the Arduino, they can break off and stay embedded in the Arduino   + Do not power the Arduino until told   + Do not change wiring while the Arduino is powered * Motor Demonstration:   + Plug the RED jumper into the 5v pin on the Arduino   + Plug the BLK jumper into the GND pin   + Describe how power comes from the 5v pin, through the motor where the electrical power turns the motor, then power leaves into the GND pin   + Get cadets to observe the speed and direction of the motor * Motor Direction   + Unplug the Arduino and swap RED and BLK wires   + Plug in Arduino, the motor direction should swap   + Unplug the Arduino * Motor Speed   + Remove the pin that is in 5v and put it in the 3.3v pin to provide a lower voltage   + Plug in the Arduino and observe the motor turning at a lower speed   + Unplug the Arduino | | |
| **Conclusion:** | * Summarise that motor voltage impacts motor speed * Summarise that the direction of electricity flow controls rotational direction * Unplug motor from Arduino * Break for 15 minutes | | |