Name_____ Period _____ Date _____

Dronopter STEM Sims

Lesson 2: Need a Lift?

Lift is the upward force that allows a flying object to rise up from the ground. Building the ideal dronopter requires choosing motors that provide enough lift for flight. Can you find out which motors support flight?

Doing the Science

1. Start the Dronopter Simulation by clicking on the "Sim" tab.
2. Record in Table 1 the mass of each of the frame structures.
3. Calculate and record in Table 1 the mass of 4 motors for each motor type.
4. Calculate and record in Table 1 the total mass of the frame and all 4 motors.
5. Select the Thrust Calculator.
6. Enter the total mass for each frame type of motor combination into the calculator and convert the value to lift force required in newtons. Record these values in Table 1.

Table 1.

Frame Type	Frame Mass (g)	Motor Type	Motor Mass (g)	Mass of 4 Motors (g)	Total Mass (g)	Total Lift Force Required (N)
Balsa		45/4/CW	45			
		50/6/CW	50			
		80/8/CW	80			
Aluminum		45/4/CW	45			
		50/6/CW	50			
		80/8/CW	80			
Composite		45/4/CW	45			
		50/6/CW	50			
		80/8/CW	80			
Steel		45/4/CW	45			
		50/6/CW	50			
		80/8/CW	80			

Do You Understand?

1. Which frame material and motor combination required the smallest lift force for flight?

2. Which frame material and motor combination required the largest lift force for flight?

3. The middle number of the motor type provides the lift given by that motor. For instance, the 50/6/CW motor gives 6 newtons or lift force. Which motor type(s) would provide enough force to lift the frame material and motor combination in question 1 off the ground? Hint: Remember that the dronopter has four motors.

4. Which motor type(s) would provide enough force to lift the frame material and motor combination in question 2 off the ground?