

Team Number: C School & Team Name: _____

Student Names: _____

CHECK-IN

Construction Parameters Part I:

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|---|---|------|--|
| T | F | 3.a. | Device is built using a microcontroller or microcontroller board, a display, LED lights, and a participant-built sensor/probe. The sensor produces a voltage which varies according to the mass of the object. WiFi/Internet connection is not used at any time during competition. |
| T | F | 3.b. | The sensor is constructed by the student from fundamental electronic components such as force sensitive resistors, strain gauges, capacitors, resistors, wires, DIP package integrated circuits, and surface mount adapter boards. All circuits are assembled on a breadboard. No preassembled devices, load cells, printed circuit boards (except digital display boards), integrated circuit daughterboards. |
| T | F | 3.c. | The construction of the device allows for the placement of an unknown mass ranging from 30 to 1,000 grams of at most 8 cm in diameter and no height obstructions for mass determination. The Device does not use any code libraries for calibration of the device. |

1. _____ NUMBER OF CONSTRUCTION & COMPETITION PARAMETERS ABOVE MET

Construction Parameters Part II:

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|---|---|------|---|
| T | F | 3.d. | The Device has a digital display that clearly shows voltage, and mass in grams to the nearest 0.1 grams. If a laptop is used for display purposes, it is not used for the Written Test portion. |
| T | F | 3.e. | The Device is able to indicate the specific concentration zone using three separate LEDs – one red, one green, and one blue. RGB LEDs, if used, is wired for only one color. |

2. _____ NUMBER OF CONSTRUCTION & COMPETITION PARAMETERS ABOVE MET

DESIGN LOG POINTS (MAX 4 POINTS EACH)

- | | | |
|-----------|----------|--|
| 3. _____ | 4.b.i. | A top-down photograph, diagram, or picture of the Device with the school name labels on the device, labels identifying all the components and detailing their functions. This section also includes a brief summary explaining how the Device was constructed. |
| 4. _____ | 4.b.ii. | A data table with at least 10 trials showing the raw sensor reading versus the corresponding masses in grams. If multiple fixed resistors are tried, data and graphs of all potential resistors are included. |
| 5. _____ | 4.b.iii. | Scatter-plot graph of this data with mass in grams on the Y-axis and voltage on the X-axis. |
| 6. _____ | 4.b.iv. | Function graph of mathematical model supported by the data overlaid on a scatter-plot of the data. |
| 7. _____ | 4.b.v. | Equation of the above mathematical model used to convert measured voltage to the corresponding mass in grams highlighted for easy identification. |
| 8. _____ | 4.b.vi. | Printout of program with code highlighted showing this exact mathematical equation or its code implementation converting raw sensor reading to grams. |
| 9. _____ | 4.b.vii. | On the same program printout, the code that will illuminate the appropriate LED(s) according to their assigned concentration ranges is highlighted |
| 10. _____ | 4.b.viii | There is a front cover labeled with the Team name and the Team Number for the current tournament. |

DESIGN LOG DEDUCTION

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|-----------|----------|---|
| 11. _____ | 6.e.ii.1 | If digital manufacturing techniques were used as part of the build, put 4 points for each section of 4.c. that was not addressed or is incomplete (Max 12 points total) |
| 12. _____ | 6.e.ii.2 | 1 point for each of 4.b.ii-4.b.vii where appropriate units were not provided (Max 4 points) |

STATION 1 STATION 2 STATION 3 STATION 4 ← DEVICE TESTING (1 MINUTES PER STATION)

- | | | | | | | | | |
|-----------|-----------|-----------|-----------|---|---|-------|---|----------------------------|
| 13. _____ | 16. _____ | 19. _____ | 22. _____ | mass in grams, to the nearest 0.1 g displayed | | | | |
| 14. _____ | 17. _____ | 20. _____ | 23. _____ | Actual mass in grams, to the nearest 0.1 g | | | | |
| 15. T | F | 18. T | F | 21. T | F | 24. T | F | Team has correct LED color |

25. _____ 6.c.i. Absolute Error Multiplier (Regional = 20, State = 30, National = 40)

WRITTEN TEST

26. _____ 6.b.iv. Written Test

27. T F General Rule: The team is disqualified. (Notify the team and their coach as soon as possible.)