

# Robofest eAcademy Standard STEM Learning Units

Certificate Exam Name: **EV3 Software**

Date: 16-Jul-20

Primary Developer Name: Elmer Santos

Reviewed by: CJ Chung

| Learning Units               |                                                                               | Level / Related Question # |          |
|------------------------------|-------------------------------------------------------------------------------|----------------------------|----------|
|                              |                                                                               | Regular                    | Advanced |
| Coding, CS, and Technologies | Sequencing (specific correct order of commands)                               | 6,7,19,23                  |          |
|                              | Decision making; Multiple cases                                               | 4,13,18,19                 |          |
|                              | Iterations, nested loops with decision structures                             | 3,13,19                    |          |
|                              | Logic flow control (repeat until, wait until...)                              | 3,4,6,7,13,19              |          |
|                              | Operators; relational operators; operator precedence                          | 23,24,25                   |          |
|                              | Variables; lists, arrays                                                      | 24                         |          |
|                              | Time, Timers                                                                  |                            |          |
|                              | Events; sending receiving messages                                            |                            |          |
|                              | Multi-tasking                                                                 |                            |          |
|                              | Structured code design: my blocks, functions, parameters                      | 20,21                      |          |
|                              | Data logging; Data file handling; Data Graphing & visualization               | 23                         |          |
|                              | Using random numbers                                                          |                            |          |
|                              | Comments                                                                      | 13                         |          |
|                              | Data formatting to display                                                    |                            |          |
|                              | Debugging & testing; Platform specific Know-hows & Tips                       | 1,2,8,9,10,18,22           |          |
| Others:                      |                                                                               |                            |          |
| Mathematics                  | Counting                                                                      |                            |          |
|                              | Unit conversions                                                              |                            |          |
|                              | Ratios, Proportions, Scale                                                    | 6,7                        |          |
|                              | Math functions: Power, Square root, etc.                                      |                            |          |
|                              | Data Analysis: Min/Max, Average, Median, Mode                                 |                            |          |
|                              | Logic: Boolean logic, Propositional Logic                                     | 23,25                      |          |
|                              | Length, Perimeter, Area, Volume                                               |                            |          |
|                              | Circles: Radius, Diameter, Circumference                                      | 6,7                        |          |
|                              | Angles, Radian                                                                |                            |          |
|                              | Pythagoras theorem                                                            |                            |          |
|                              | Trigonometry                                                                  |                            |          |
| Others:                      |                                                                               |                            |          |
| Science & Engineering        | Basic kinematics: Motion, Displacement, Speed, Velocity, Acceleration         |                            |          |
|                              | Momentum                                                                      |                            |          |
|                              | Friction                                                                      |                            |          |
|                              | Force; Laws of Motion                                                         |                            |          |
|                              | Gears: Reduction, Ratio, Speed, Torque (rotational force), Types              |                            |          |
|                              | Simple Machines: Lever, Wheel & Axle, Pulley, etc.                            |                            |          |
|                              | Center of gravity                                                             |                            |          |
|                              | Sensor: types, modes (raw or %), units (rotations or degrees), calibration    | 5,6,7,13                   |          |
| Others:                      |                                                                               |                            |          |
| Basic robotics tasks         | Sensor value monitoring; Use of various sensor data                           | 11,12,18,19                |          |
|                              | Turning & spinning a certain angle; Steering                                  | 5,14,15,16,17              |          |
|                              | Go straight forward exactly a certain distance or target location; Navigation | 6,7                        |          |
|                              | Line following                                                                | 13                         |          |
|                              | Object detection & avoidance                                                  |                            |          |
|                              | Object manipulation                                                           |                            |          |
|                              | Others:                                                                       |                            |          |