MATH:

ACT Math Alignment – Autonomous Vehicle

Motion, Measurement & Computation

Students will apply mathematical concepts to calculate water-to-nutrient ratios, analyze plant growth rates, and interpret data related to hydroponic farming. They will work with real-world mathematical models, using measurements, ratios, proportions, and statistical analysis to optimize plant health in a controlled environment.

Potential ACT Math Standards Covered in this Unit

This unit connects to ACT Math skills in five key areas:
ACT Math Rating Scale – Problem Solving & Quantitative Reasoning

1. **(16–19): Understanding basic measurements and speed calculations**
   - Measure distance and time during robotic activities.
   - Calculate speed using simple formulas (speed = distance ÷ time).
   - Understand basic units of measurement.

2. **(20–23): Applying ratio and proportion to sensor adjustments**
   - Use ratios and proportions to adjust motor speeds and sensor sensitivity.
   - Set up and solve proportion equations for accurate robotic performance.
   - Apply proportional reasoning to navigation tasks.

3. **(24–27): Analyzing statistical variations in robotic car movements**
   - Collect and organize data from multiple robotic trials.
   - Calculate averages, identify outliers, and explain experimental variability.
   - Interpret variations to improve robotic performance.

4. **(28–32): Interpreting graphical data on distance, time, and acceleration**
   - Read and interpret distance vs. time and velocity vs. time graphs.
   - Explain slopes, identify constant versus changing speeds.
   - Connect graphical trends to real-world robotic behavior.

5. **(33–36): Predicting optimal speed and navigation paths using algebraic equations**
   - Create and solve algebraic models for predicting motion outcomes.

- Integrate factors like acceleration, friction, and turning angles into calculations.
- Optimize robotic car performance using multi-step problem-solving strategies.

Why This Matters for ACT Preparation?

By engaging in math-based activities connected to the Robotic Car Kit, students:

✅ Practice applying math to real-world systems like speed calculation, distance measurement, and time tracking.
✅ Strengthen their skills in ratios, proportions, unit conversions, graph interpretation, and data analysis.
✅ Solve problems involving motion equations, acceleration patterns, and navigation path predictions using mathematical formulas.

These hands-on, robotics-based activities help students make sense of data, movement, and measurements in a practical context—mirroring the ACT Math focus on real-life problem solving, data interpretation, and quantitative reasoning. Students gain essential skills that not only prepare them for ACT success but also for future STEM careers in fields like engineering, computer science, and robotics.