

UNIT: AUTONOMOUS VEHICLE

ACT-BASED MATH: SPEED AND DISTANCE CALCULATIONS

Here are ACT-aligned math activities for the **Robotic Car Kit** that help students apply real-world skills in measurement, speed and distance calculations, ratio and proportion adjustments, and data interpretation related to sensor readings, motion paths, and acceleration tracking.

OBJECTIVE:

Students will measure and calculate the speed of the robotic car.

MATERIALS NEEDED:

- Measuring tape
- Stopwatch
- Robotic car
- Data recording sheets

STUDENT DIRECTIONS:**Goal:**

To apply real-world math skills by measuring how far and how fast a robotic car travels, then calculating its speed using the formula **Speed = Distance ÷ Time**. This activity reinforces proportional reasoning and builds fluency with units and rates.

Step 1: Set Up a Track and Mark Distance Points

- Choose a smooth, flat surface (like a hallway or classroom floor).
- Use masking tape or chalk to create a **straight track** at least 3 meters long.
- Mark every **0.5 meters or 1 meter** along the track (these will help track progress and check for consistency).

Optional: Add a "Start" and "Finish" label.

Step 2: Program and Test the Robotic Car

- Use your classroom device or remote to **program the robotic car** to travel in a straight line across the track.
- Make sure the car starts **from the same point** each time.
- You may need to run a few tests to ensure the path is smooth and repeatable.

Safety Check: Make sure there are no obstacles or cords in the way.

Step 3: Measure Time for Travel Distances

- Use the stopwatch to measure **how long it takes** the robotic car to travel a **specific distance** (such as 1 meter, 2 meters, or 3 meters).
- **Repeat the run at least 2–3 times** and average your results for accuracy.

Example Data Table:

Trial	Distance (meters)	Time (seconds)	Speed (m/s)
1	1.2	2.0	?
2	1.2	2.1	?
Avg	1.2	2.05	?

Step 4: Calculate Speed

Use the formula:

$$\text{Speed} = \text{Distance} \div \text{Time}$$

- Plug your average time and distance into the formula.
- Calculate speed in **meters per second (m/s)**.
- Round answers to **2 decimal places** if needed.

Example:

If Distance = 1.2 meters and Time = 2 seconds

$$\text{Speed} = 1.2 \div 2 = \mathbf{0.6 \text{ m/s}}$$

- Record all your calculations in your data sheet.

ACT-STYLE QUESTION:

- A robotic car travels 4 meters in 3 seconds. What is its speed?
- A. 0.50 m/s
B. 0.75 m/s
C. 1.33 m/s
D. 2.00 m/s

⚡ Why These Activities and Questions Matter

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

- ✓ Apply math concepts to real-world systems such as speed, distance, time calculations, and sensor-based adjustments.
- ✓ Build skills in ratio reasoning, unit conversions, interpreting graphs, and analyzing data from robotic movements.
- ✓ Use formulas to calculate acceleration, predict travel times, and optimize navigation paths in different driving conditions.

These hands-on, math-rich tasks mirror the ACT Math emphasis on practical problem-solving and quantitative reasoning—preparing students for test success and real-world applications in STEM careers.