Name:	**School:**
Course:	**Room Number:**
Unit Title: Artificial Intelligence and Transportation **Lesson Title:** AI on the Move: Exploring Smart Transportation 2.0	**Date:** **Class Length:** 60 minutes

Common Core State Standards:

Math & ELA

- **CCSS.MATH.PRACTICE.MP4** – Model with mathematics.
- **CCSS.MATH.CONTENT.4.MD.B.4** – Make a line plot to display a data set of measurements.
- **CCSS.ELA-LITERACY.SL.4.4** – Present information using visuals and explanations.
- **CCSS.ELA-LITERACY.RI.3-5.3** – Explain relationships or interactions between individuals, events, ideas, or concepts in a text.

Next Generation Science Standards

- **3-5-ETS1-1** – Define a design problem with criteria and constraints.
- **3-5-ETS1-2** – Compare solutions to meet design requirements.
- **3-PS2-4** – Define a simple design problem with criteria for success.
- **3-5-ETS1-3** – Plan and carry out fair tests to improve design performance.

ISTE Standards

- **4. Innovative Designer** – Students use digital tools to creatively solve challenges.
- **5. Computational Thinker** – Students develop and test sequences of commands or algorithms.
- **6. Creative Communicator** – Students communicate logical steps and solutions.

CSTA Standards

- **1B-AP-10** – Create programs with conditionals and loops.
- **1B-AP-15** – Test and debug to improve algorithm performance.
- **1B-DA-06** – Present collected data visually to support decisions.
- **1B-IC-21** – Discuss the social impact of computing technologies.

Objective:

Students will:

- Understand how artificial intelligence is used in transportation.
- Understand how machine learning systems use data and patterns to make predictions.
- Explain how AI powered vehicles can make decisions based on information.
- Identify examples of training data in transportation.
- Use transportation vocabulary including pattern, data, algorithm, prediction, training, and model.
- Create and test a step-by-step route for an AI vehicle.
- Record successful and unsuccessful attempts as training data.
- Modify a route based on previous results.

Challenge Based Learning Alignment:

Big Idea:

AI, Transportation & Smart Decision-Making

Modern transportation systems increasingly use data and algorithms to help vehicles and traffic systems make decisions**.**

Essential Question(s):

- **How does AI help vehicles make decisions?**
- **What information does an autonomous vehicle need?**
- **How can AI recognize patterns in transportation data?**
- **What happens when an AI system makes a mistake?**
- **How can previous attempts become training data?**

Challenge:

How can we train an AI transportation system to make better decisions and move people or objects safely and efficiently?

Students become AI Transportation Engineers responsible for testing, collecting data, improving routes, and designing smarter transportation systems.

Success Criteria:

By the end of the lesson, students will be able to:

- Define AI and machine learning.
- Explain what data is.
- Explain what training means in machine learning.
- Identify a transportation pattern.
- Explain what an algorithm is.
- Make a prediction based on available information.
- Create a step-by-step route.
- Test whether their route works.
- Record successes and mistakes as data.
- Improve their route after an unsuccessful attempt.

Conceptual Understanding:

Students should understand that:

- AI systems use information to make decisions.
- Machine learning allows computers to improve by learning from examples and data.
- Transportation systems generate useful data.
- AI can identify patterns in transportation data.

- AI can use patterns to make predictions.
- An algorithm is a set of steps used to complete a task.
- An unsuccessful attempt can still provide useful information.
- Training data can include both successful and unsuccessful results.
- AI systems can adjust based on previous results.

Apple & AI tools:
Teacher Tools:

- Computer
- Projector/display
- Transportation video
- Pre-assessment/Kahoot
- Whiteboard
- Floor tape
- Cones, blocks, or other obstacles
- Colored red, yellow, and green cards
- CEAMLS Dollars

Student Tools:

- Sphero RVR, if available
- Arrows or route-planning cards
- Floor markers
- Traffic-light cards
- Notebook or training-data sheet
- Pencil

Assessment Strategies:

Pre-Assessment

Ask students:

- What is artificial intelligence?
- Where have you seen AI used in transportation?
- How could a car know when something is in front of it?
- What information might a self-driving car need?
- Can a computer learn from making a mistake?
- How could AI help with traffic?

Formative Assessment

Observe whether students can:

- Use vocabulary correctly.
- Create logical routes.
- Predict whether a route will work.
- Identify obstacles.
- Record training data.
- Modify unsuccessful routes.
- Identify traffic patterns.
- Explain why a traffic jam occurred.
- Collaborate with group members.
- Explain how their second attempt improved upon their first.

Summative/Closing Assessment

Students explain:

1. What their transportation problem was.
2. What their first solution was.
3. What happened during testing.
4. What data they collected.
5. What they changed.
6. Whether their second attempt improved.
7. How this process is similar to machine learning.

Agenda:

0–10 Minutes — ENGAGE
Welcome, Transportation Video & Pre-Assessment

10–15 Minutes — AI Transportation Introduction
AI, Machine Learning, Patterns, Data & Predictions

15–30 Minutes — INVESTIGATE
AI Obstacle Navigation Challenge

30–45 Minutes — ACT
Smart Traffic Light Challenge

45–55 Minutes — Compare, Improve & Share

55–60 Minutes — Post-Assessment & Reflection

General Modifications:

Equitable & Ethical AI Use:	**Real-World AI Connections:**	**Building Ethical Reasoning Use of AI:**	**Student Voice in Ethical AI Design:**
Students should understand that transportation AI makes decisions that can affect people's safety, mobility, and access to transportation. Introduce the idea that an AI transportation system should not only be fast it should also be safe and useful for different people. **Ethical Questions** Ask: ● Should a self-driving car always choose	Ask students: "If you were designing a self-driving vehicle for your community, what rules would you give its AI?" Possible student rules: ● Always stop for pedestrians. ● Follow traffic lights. ● Do not drive too fast. ● Slow down near schools. ● Stop when an obstacle is detected. ● Choose safe routes. ● Ask a human for help when uncertain.	Students evaluate AI transportation decisions by considering safety, accuracy, and the effects on people. During the obstacle and traffic-light challenges, students discuss what should happen when an AI system makes a mistake, whether the fastest route is always the safest route, and why humans should test and oversee AI transportation systems. Students use the results of each trial to determine whether an AI decision should be accepted, changed, or improved.	Students act as AI transportation designers and create rules for how an autonomous vehicle or smart traffic system should behave. They decide what the AI should prioritize such as pedestrian safety, traffic laws, avoiding obstacles, reducing congestion, and asking for human help when uncertain then explain and defend their design choices. Students may revise their rules after testing the system and observing how their decisions affect safety and traffic flow.

the fastest route? ● What if the fastest route is not the safest route? ● What happens if a transportation AI receives incorrect information? ● Who should be responsible for testing an autonomous vehicle? ● Should humans always be able to take control? ● How should smart transportation systems consider pedestrians? ● How can transportation technology be designed so different communities benefit from it?			

Check for AI Ethics Emphasis

ENGAGE:

Activity 1 – ENGAGE: How Does AI Move Us?

Begin with:

"What makes a vehicle smart?"

Ask:

- Can a car make decisions?
- How would a car know when to stop?
- How would it know where to go?
- How could it know that another car is nearby?
- How could AI help a delivery vehicle?

Play a short video showing AI or autonomous transportation.

Then complete the pre-assessment.

Connect AI Learning to Student Learning

Tell students:

"Just like you learn from practice and experience, AI learns by looking at patterns in data."

Use the example from the lesson:

INVESTIGATE:

Activity 2 – INVESTIGATE: AI Obstacle Navigation Challenge

Driving With Data

Students help an "AI car" navigate an obstacle course.

Explain:

"Your AI doesn't automatically know the correct route. You have to train it."

Step 1 – Observe

Students examine:

- Starting point
- Finish point
- Obstacles

Step 2 – Plan

Students use arrows or blocks to create a sequence.

Example:

Forward → Forward → Right → Forward → Left → Forward

Explain that the ordered instructions function like an algorithm.

Step 3 – Predict

Before moving the car,

ACT:

Activity 3 – ACT: Train the Smart Traffic Light

Students now become AI Traffic Engineers.

Their challenge:

Design a traffic-light sequence that moves vehicles through an intersection while avoiding traffic jams.

The source frames this as training an AI system controlling a busy intersection, testing red/yellow/green sequences, recording results, and adjusting the sequence using observed data.

Step 1 – Set Up the Intersection

Create an intersection using tape or floor markers.

Place toy cars on different sides.

Step 2 – Design a Sequence

Students arrange:

🔴 **Red**
🟡 **Yellow**
🟢 **Green**

Students determine which direction receives each signal and for how long.

Assessment:

Formative Assessments

- Pre-assessment
- Transportation vocabulary
- Route-planning observations
- Predictions
- Training-data sheet
- Obstacle-course performance
- Traffic-light sequences
- Group discussions
- Student explanations

If the school bus is repeatedly late on rainy days, that is a pattern. An AI system could analyze many examples and potentially use that pattern when making predictions. Introduce: **DATA → PATTERN → PREDICTION → DECISION**	students answer: "Do you predict your route will work? Why?" **Step** 4 – Test Move the toy car or robot through the route. **Step** 5 – Collect Training Data Both attempts are useful data. **Step** 6 – Improve If the vehicle hits an obstacle, students modify the algorithm. **Step** 7 – Retest Students run their improved route.	**Step** 3 – Predict Ask: "What do you think will happen when we run your sequence?" Students predict: ● Smooth traffic ● Small delay ● Traffic jam ● Collision/problem **Step** 4 – Test Move cars according to the traffic-light sequence. **Step** 5 – Record Data Students record: ● Cars successfully moved ● Cars waiting ● Traffic jams ● Problems ● Successful sequences **Step** 6 – Improve Students modify the traffic-light algorithm. **Step** 7 – Retest Run the new sequence.	

Activity 1 (ENGAGE – 30 minutes):

Ask:

"What kinds of patterns could an AI transportation system look for?"

Activity 2 (INVESTIGATE – 60 minutes):

Ask:

- What pattern helped your car succeed?
- What happened during your first attempt?
- What did you learn from the mistake?
- What did you change?
- Did the new route work better?
- How is this similar to a self-driving vehicle learning from data?

Activity 3 (ACT – 60 minutes):

Step 1 – Test

Move cars according to the traffic-light sequence.

Step 2 – Record Data

Students record:

- Cars successfully moved
- Cars waiting
- Traffic jams
- Problems
- Successful sequences

Step 3 – Improve

Students modify the traffic-light algorithm.

Step 4 – Retest

Run the new sequence.

Step 5 – Compare

Ask:

- Which sequence worked better?
- What data helped you decide?
- What caused the traffic jam?
- What pattern helped traffic move?
- What did you change?
- How could an actual smart traffic system use this information?

Assessment:

Performance Assessment

Students complete the:

AI Transportation Training Cycle

PLAN → PREDICT → TEST → COLLECT DATA → IMPROVE → RETEST

Students must demonstrate that they understand that an unsuccessful result is not simply "wrong"; it provides information that can be used to improve the next attempt.

Success Indicators

Student:

- Creates an ordered route.
- Make a prediction.
- Tests the route.
- Identifies a problem.
- Record the result.
- Make an appropriate change.
- Retests.
- Explains whether the performance improved.
- Uses at least two AI vocabulary terms correctly.

Details / Activities

Wrap Up/Reflection/Closure:

Teachers can ask:

- What does AI use to learn?
- What is training data?
- What is a pattern?
- What is an algorithm?
- What is a prediction?
- What happened when your first route didn't work?
- How did your second attempt improve?
- What traffic-light pattern worked best?
- Why do smart transportation systems need data?
- Can AI make mistakes?
- Why are humans still important?
- How could AI make transportation safer?
- How could AI make transportation more efficient?

Finish with:

"*Today, you trained transportation systems by giving them instructions, testing those instructions, collecting data, and improving your solutions. Real AI transportation systems also use information and patterns to make decisions. But humans are still responsible for designing, testing, and improving those systems so they can work safely and effectively."*

Supportive Models:	**Reflective Practice:**	**Growth Mindset:**	**Assessment:**
• Transportation video • Vocabulary cards • Toy vehicles • Sphero RVR • Floor route • Directional arrows • Obstacle markers • Traffic-light cards • Sample algorithms	Students reflect on: • What they learned about AI and transportation. • What data their AI transportation system collected. • What went wrong during the first attempt. • How they	Emphasize that: • A failed route provides useful information. • Engineers rarely create the perfect solution on their first attempt. • Testing helps us discover problems. • Changing an algorithm is part of problem-solving	Students design, test, and improve an AI-inspired transportation system by collecting training data, identifying patterns, and modifying an algorithm. Students explain how data, predictions, and trial-and-error can help AI transportation systems make better decisions.

• Training-data table • Teacher think-aloud • Route-planning worksheet • Partner collaboration • Physical demonstrations • Visual traffic intersection	improved their solution. • Which transportation pattern they discovered. • How predictions helped them. • How their algorithm changed. • Why mistakes can provide useful data. • How humans help AI systems improve.	• Students should use evidence instead of simply guessing. • Different groups may find different successful solutions. • AI systems also need examples and repeated testing before they can perform well.	

Closing Remarks:

"Today, you became an AI Transportation Engineer. You discovered that smart vehicles and transportation systems don't simply "know" what to do. They use data, recognize patterns, make predictions, follow algorithms, and learn from previous results. When your vehicle hit an obstacle or your traffic system created a jam, you used that information to improve your solution. That's an important part of both engineering and machine learning. Most importantly, you learned that people still play a major role in designing, testing, and improving AI so transportation technology can become safer and more useful for everyone."