Name:	**School:**
Course:	**Room Number:**

Unit Title: Artificial Intelligence & Neural Networks **Lesson Title:** Exploring Neural Networks with Cece	**Date:** **Class Length:** 60 minutes

Common Core State Standards:

Common Core

- **CCSS.ELA-LITERACY.SL.3.1** – Collaborative discussions
- **CCSS.ELA-LITERACY.L.3.5** – Word relationships and meanings

NGSS

- **3-5-ETS1-2** – Generate and compare possible solutions
- **3-5-ETS1-3** – Conduct fair tests and identify areas for improvement

CSTA

- **1B-IC-18** – Discuss the influence of computing technologies
- **1B-CS-02** – Use appropriate terminology for computing-system components

ISTE

- **1.6 Creative Communicator**
- **1.7 Global Collaborator**

Engineering

- **Engineering Design (3-5-ETS1)** – Define problems, develop solutions, and optimize designs.

Objective:

Students will be able to:

Students will:

- Understand the concept of neural networks and how they function.
- Identify the basic components of a neural network.
- Explain the roles of the input layer, hidden layer, and output layer.
- Understand that neural networks process information through interconnected artificial neurons.
- Compare artificial neural networks with the human brain at an introductory level.
- Explore practical examples of neural networks in everyday technology.

Challenge Based Learning Alignment:

Big Idea

Connected Information & Intelligent Systems

Neural networks use interconnected units to receive, process, and interpret information, allowing computers to recognize patterns and support AI applications.

Success Criteria:

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

- Define a neural network in their own words.
- Explain that neural networks are inspired by the structure and function of the human brain.
- Identify neurons/nodes and connections/edges as basic components.
- Identify the input, hidden, and output layers of a simple neural network.
- Describe how information moves through those layers.
- Participate in the Human Neural Network Relay and correctly perform the role of an assigned neuron.
- Explain why accurate data is important to a neural network.

Conceptual Understanding:

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

- Neural networks are computer systems inspired by aspects of the human brain's structure and function.
- The brain contains neurons connected by synapses, while artificial neural networks contain artificial neurons connected by weighted links.
- Neural networks process information through interconnected units.
- A basic neural network can be represented using an **input layer, hidden layer, and output layer**.
- The input layer receives information.
- Hidden layers process or combine information.

Apple & AI tools:
Teacher Tools:

- *Keynote* – neural-network diagrams and instruction
- *Apple Classroom* – device management
- *Scratch*
- *Kahoot*
- *Projector/display*
- *Neural-network diagrams*

Assessment Strategies:

Formative Assessment

- Prior-knowledge questioning
- Story comprehension
- Vocabulary review
- Teacher observation during the Human Neural Network Relay
- Identification of input, hidden, and output layers
- Real-world neural-network discussion
- Scratch Maze Craze activity
- Student questioning and explanations
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Student Tools:

- iPad or computer
- Safari
- Scratch
- Kahoot
- Digital or physical neural-network diagrams

Closing Assessment

- Kahoot
- Student reflection
- Exit ticket
- Explanation of how information travels through a neural network

Agenda:

1. Introduction to Neural Networks – 5 minutes

- Introduce objectives
- Compare neural networks and the human brain
- Explain how neural networks learn

2. Cece's Robo-Romp Through Neural Networks – 10 minutes

- Read story
- Review vocabulary
- Identify neural-network functions

3. Neural Network Relay – 10 minutes

- Students become artificial neurons
- Model input, hidden, and output layers
- Pass information through the network

4. Discussion – 5 minutes

- Examine everyday neural-network applications
- Discuss what students observed

5. Maze Craze with Scratch – 25 minutes

- Introduce Scratch
- Create maze
- Add sprites
- Program movement
- Use collision detection
- Test and improve the maze

6. Kahoot – 5 minutes

General Modifications:

Equitable & Ethical AI Use	**Real-World AI Connections:**	**Building Ethical Reasoning Use of AI:**	**Student Voice in Ethical AI Design:**
Students learn that neural networks depend on data to function effectively. Introduce the idea that the quality and accuracy of information provided to a neural network can affect the results it produces.	Students connect neural networks to technologies such as: ● Social media recommendations ● Gaming ● Recommendation systems ● Image recognition ● AI-powered applications	You could ask: ● What could happen if a neural network receives incorrect information? ● Should we automatically trust a neural network's output? ● Who should check whether an AI system's prediction is correct? ● Could different training data produce different results? ● How might an incorrect AI prediction affect someone?	Ask: "*If you were training a neural network to recognize pictures, what would you do to help it make accurate decisions?*" Students could suggest: ● Providing many examples ● Providing accurate examples ● Testing predictions ● Correcting mistakes

Check for AI Ethics Emphasis

ENGAGE:

Activity 1 – ENGAGE: How Does Information Travel?

Begin by showing students an image of a brain.

Ask:

- What does your brain help you do?
- How does your brain receive information?
- What happens after your brain receives information?
- Can a computer process information in a similar way?

Introduce:

Neural Network:
A computer system made of connected artificial neurons that processes information and is inspired by aspects of how the human brain works.

Then introduce Cece's Robo-Romp Through Neural Networks.

Have students focus on:

- What neural networks do
- How they help

INVESTIGATE:

Activity 2 – INVESTIGATE: Human Neural Network Relay

This should be the centerpiece of the lesson because it physically demonstrates the concept.

Step 1 — Assign Roles

Create:

Input Layer

- I1
- I2
- I3

Hidden Layer

- H1
- H2
- H3

Output Layer

- O1
- O2

Step 2 — Create Connections

Students hold colored strings connecting:

Input → Hidden → Output

The diagram on page 3 visually models this arrangement, with three input neurons, three hidden neurons, and two output neurons connected as a simple network.

Step 3 — Introduce

ACT:

Step 1 — Introduce Scratch

Teach:

- Stage: Where the activity occurs
- Sprites: Characters or objects
- Code Blocks: Instructions
- Categories: Groups of different programming blocks

These definitions come directly from the guide.

Step 2 — Create the Maze

Students create or upload a maze backdrop.

Discuss:

Walls = barriers

Paths = possible routes

Step 3 — Add Sprites

Students add two characters to race through the maze.

Step 4 — Program Movement

Students program:

- Up
- Down

Assessment:

Formative Assessments

- Oral questioning
- Cece story discussion
- Vocabulary review
- Neural Network Relay
- Identification of neural-network layers
- Real-world application discussion
- Scratch Maze Craze
- Teacher observation

Kahoot Assessment

Students demonstrate understanding of:

- Neural networks
- Human brain inspiration
- Neurons
- Weighted links
- Input neurons
- Data
- Neural-network connections
- Real-world applications
- Scratch programming

Cece ● How information moves ● Important vocabulary	Input Show the class the Ninja Cat or another image. Give input neurons pieces of information: ● I1: "The animal has whiskers." ● I2: "The animal is wearing a black mask." ● I3: "The animal is a cat." **Step 4** — Process Input students communicate their information to hidden neurons. Hidden neurons combine the information. They then communicate the combined information to the output layer. **Step 5** — Produce an Output Output neurons use the information they received to guess the original image. **Step 6** — Reflect Reveal the image. Ask: ● Was the network correct? ● What information was most useful? ● What happened in the hidden layer? ● What would happen if one input contained incorrect information?	● Left ● Right using arrow keys or WASD controls. Step 5 — Add Collision Detection Students use conditional blocks so sprites cannot move through maze walls. For example: If not touching [wall color] → move Step 6 — Test Students test their program and identify problems. Step 7 — Improve Students can add: ● Timers ● Obstacles ● Power-ups ● Sounds ● Visual effects	

Activity 1 (ENGAGE – 30 minutes):	**Activity 2 (INVESTIGATE – 60 minutes):**	**Activity 3 (ACT – 60 minutes):**	**Assessment:**
Ask students to complete: "A neural network is _____ and it helps computers _____."	Students should be able to explain: Input → Processing → Output and identify which neural-network layer performed each function.	**ACT Assessment** **Students demonstrate that they can:** ● Create or use a maze ● Add sprites ● Program movement ● Use conditional logic ● Test their program ● Identify and correct errors ● Explain how computers follow programmed instructions	

Details / Activities

Wrap Up/Reflection/Closure

Supportive Models:	**Reflective Practice:**	**Growth Mindset:**	**Assessment:**
● Human-brain comparison ● Visual neural-network diagram ● Input → Hidden → Output model ● Color-coded strings ● Teacher modeling ● Think-aloud demonstrations ● Scratch coding examples ● Peer	*Students reflect on:* ● How their understanding of neural networks changed. ● How the Human Neural Network helped them understand information processing. ● Which role—input, hidden, or	*Emphasize*: ● Neural networks learn and improve through data and experience. ● Mistakes during the relay can help students understand how information affects an output. ● Scratch programs may not work correctly the	Closing reflection and exit ticket assessing students' understanding of neural networks, input/hidden/output layers, information processing, and real-world applications.

collaboration • Guided questioning • Sentence starters • Vocabulary cards	output—was easiest to understand. • What happened when information traveled through the network. • Where they encounter neural networks in everyday life.	first time. • Debugging is part of programming.	

Closing Remarks:

Neural networks help computers process information by passing data through connected artificial neurons. Today, we modeled how information moves through input, hidden, and output layers and explored how neural networks appear in technologies we use every day. As neural networks continue to shape AI, understanding how they process information and why accurate data matters will help us become more informed and responsible users and creators of technology.