

2 | How AI Works

• NGSS MS-ETS1-4 (Data model development) • CCSS.MATH.PRACTICE.MP4 (Mathematical modeling application)
• ISTE 5.c (Computational thinking skills) • CSTA 2-AP-10 (Algorithm representation skills)

How AI Works: Teaching Computers to Think

Picture this: Your phone suggests the perfect song, helps you spell a tough word, and reminds you about homework—all before you even ask. That's AI in action! But how does it actually work behind the scenes?

The Secret Recipe: Data + Algorithms

Think of AI as a really smart student that needs two things to learn: information and a method.

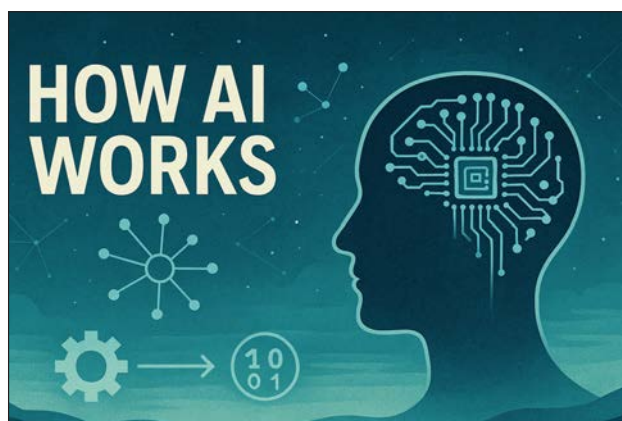
Data is all the information AI uses. Just like you need examples to learn math concepts, AI needs examples too—lots of them! When Spotify recommends songs you like, it's because it has data on thousands of songs you and others have enjoyed before.

Algorithms are like recipes that tell the AI what to do with all that data. These special instructions help the computer find patterns and make decisions based on what it learns.

Machine Learning: AI's Superpower

The coolest part of AI is machine learning—it's how computers learn without someone programming every single instruction.

Here's how it works: Instead of telling a computer exactly what a cat looks like (four legs, pointy ears, whiskers), you show it thousands of cat pictures. The AI figures out the patterns itself!



AI learns by spotting patterns in tons of examples—just like you get better at games or sports by practicing.

It's like how you learned to recognize your friends' faces. Nobody gave you a list of exactly how far apart their eyes should be or how their nose is shaped. You just saw them a bunch of times, and your brain did the rest!

Training AI: Practice, Mistakes, Repeat

When you're learning to play basketball, you practice shooting hoops over and over. Sometimes you miss, but you adjust your technique each time.

AI works the same way:

- First, it gets tons of examples (like thousands of cat photos)
- Then it makes its best guess ("Is this a cat?")
- It checks if it was right or wrong
- It adjusts its thinking to do better next time

The more practice it gets, the better it becomes at making predictions. That's why your text autocomplete gets better at guessing what you'll type next the more you use it.

AI in Your Life

You're already using AI every day, probably without realizing it:

- When your video game enemies get smarter as you play
- When your phone's camera automatically focuses on faces
- When a website shows you products you might like
- When your spelling gets autocorrected as you type

What AI Can't Do (Yet)

Despite what science fiction shows, today's AI has some major limitations:

AI isn't actually "smart" like you are.

It can't truly understand things—it just recognizes patterns really well. Your phone's AI might nail spelling corrections but has zero clue what the words actually mean.

AI only knows what it's shown.

If an AI has only seen pictures of dogs with four legs, it might not recognize a three-legged dog as a dog at all!

AI needs specific training for each job.

An AI that's amazing at chess would be



Machine learning helps AI get smarter by practicing with examples—no one has to program every single step.

completely useless at identifying birds or writing poetry unless specifically trained for those tasks.

AI Ethics: Important Questions to Consider

As AI becomes more common in our world, it brings up some important questions we need to think about:

Fairness matters. If the data used to train AI isn't diverse enough, the AI might work better for some people than others. Imagine a voice assistant that only understands certain accents!

Privacy is a big deal.

AI works best with lots of data, but that often means collecting information about what people do, say, and like. How much of your information are you comfortable sharing?

Human judgment is still crucial. Even the smartest AI can make mistakes or miss important context. That's why humans need to stay involved, especially for important decisions. A doctor might use AI to help spot a disease in an X-ray, but the final diagnosis should always come from the human expert.

TRY THIS PROMPT:

Try typing this prompt into a GPT to see AI in action:

"I want to learn about machine learning. Can you explain it through a short story about a robot pet learning to recognize its owner's emotions? Include how the robot collects data, makes mistakes, and gets better over time."



Alex AI

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GUIDED NOTES

Key Terms

1. Artificial Intelligence (AI): _____
2. Algorithm: _____
3. Data: _____
4. Machine Learning: _____
5. Training: _____

Main Concept Overview

Fill in the blanks using the words from the word bank:

Word Bank: patterns, examples, predictions, specific, practice

1. Instead of giving computers _____ instructions for every situation, machine learning allows AI to learn from _____.
2. When training AI, it makes its best guess, checks if it was right, and adjusts to do better with more _____.
3. AI systems are good at recognizing _____ in data and making _____ based on what they've learned.

Matching Section

Match each term with its correct description:

- | | |
|----------------------------------|--|
| _____ 1. Data | A. Step-by-step instructions that tell a computer how to solve a problem |
| _____ 2. Algorithm | B. The process of showing AI many examples so it can improve |
| _____ 3. Machine Learning | C. Information that AI uses to find patterns |
| _____ 4. Training | D. Technology that allows computers to perform tasks that typically require human intelligence |
| _____ 5. Artificial Intelligence | E. Type of AI that learns from examples instead of being directly programmed |

True/False Questions

Mark each statement as True (T) or False (F):

- _____ 1. AI systems understand the meaning of words just like humans do.
- _____ 2. Machine learning allows computers to learn without being programmed for every situation.
- _____ 3. AI needs specific training for each different job it performs.
- _____ 4. Once trained, AI systems never make mistakes
- _____ 5. Current AI has feelings and consciousness like humans.

Fill in the Table

Complete the table about the AI training process:

Training Step	What Happens
Gathering data	
Learning patterns	
Making predictions	
Getting feedback	

Critical Thinking Questions

1. How is the way AI learns different from how you learn in school? Think about the similarities and differences.

2. Why is it important for humans to stay involved in decisions made by AI? Give an example of when human judgment would be more valuable than AI predictions.

2 | How AI Works - Reflection Questions

#1

How might you use AI to help with a problem or challenge you face at school?

Think about tasks that are repetitive or things you find difficult. How could a computer that learns from examples help with these tasks? What kind of information would it need to learn from?

#2

How do you feel about AI systems making suggestions for you, like recommending videos or music?

Think about times when these suggestions have been helpful or times when they missed the mark. Do you prefer choosing things on your own or getting AI recommendations?

#3

What's something you're good at that would be difficult to teach an AI?

Consider skills that require creativity, emotional understanding, or physical coordination. Why would these be challenging for an AI to learn? What makes human abilities different?

AI Activity: Teach the AI

Imagine you're training an AI to understand how machine learning works. Create a simple step-by-step explanation that would help the AI understand this concept.

Write your explanation as if you're teaching a brand new AI that's just learning about the world!

Your explanation should include:

- What data the AI needs to learn
- How the AI finds patterns in that data
- How the AI improves over time
- A simple example (like recognizing animals or recommending songs)

AI Activity: Truth Test Challenge

Read this flawed AI response about how machine learning works.

- Identify at least three things wrong with this explanation
- Explain what's actually correct for each mistake
- Write a better prompt that would help the AI give accurate information about machine learning

"Machine learning is when computers become smart like humans and develop their own intelligence. Once an AI is trained, it never makes mistakes again. The AI brain works exactly like a human brain, with electronic neurons that think and feel. AI systems can understand anything after seeing just one or two examples."

2 | How AI Works - Hypotheticals

Scenario: School AI Assistant	
Your school is testing an AI assistant that helps grade assignments and suggest lessons for students. A. What information would this AI need to learn about students to be helpful? B. What problems might happen if the AI only has data from high-achieving students? C. How would you make sure this AI treats all students fairly?	

Scenario: Smart Game Designer	
You're creating an AI that designs custom video game levels based on how players like to play. A. What data should your AI collect about players to design better levels? B. How could your AI learn from mistakes when players don't like certain levels? C. Would you want the AI to keep making levels more difficult? Why or why not?	

TERM	DEFINITION
Algorithm	
Artificial Intelligence (AI)	
Data	
Feedback	
Learning	
Machine Learning	
Pattern	
Prediction	
Testing	
Training	

How AI Works

P V L F N V K A P A T U T H P F P C H A P I E P
L U N V Q R F E U U L K M O E U I C S R V T V B
Y X O V L Q U P R S O G E W J N U E R T P C A G
P W I Z Z P Q T F S J M O X G Z K U C I Q Z D E
B A F F H E W G A D D S A R P W B E X F V Y P Q
M R Z T R A I N I N G R W Z I V N M Q I F U R J
N O X G O G A P A J E V P G F T L P Z C M X E Q
C W D G P A U Z Z Y D U N E A G H F H I W C D Y
H O W C S Q U C X U X S C T X D U M A A E A I K
F P A T T E R N P N G H Q I H L V Y V L L S C O
P S D R F E C O L Y U H G Y L A K U S I V P T O
W E L N C A S C X Z Q X L D V E K R M N K D I D
Q Z I U W I D T Y K C I E O B N A R U T M E O Z
S Q C I X X Q M I J F E A O F U L X Y E C K N A
E W L U G Y I E Y N S F E E D B A C K L O P C Y
U D R Q I S C S L E G D A H A N N R G L R D G D
V D X D N V D V Y E R J K Y Q N N K K I M M K V
L P M J Y T F H I O A P B Y X X Y R F G A Y I F
E C N R H I B T H Y W R C I H J K J R E C I Y S
S O M F F J B X C E T A N E L X N V P N H N R R
L V K J H F G Y D B Q E Q I Y A J T I C I Q L Z
W E A Y X B A X C A U E F D N I K B P E N E H X
I F X U A L A P P E T O Q T R G R I H X E H X L
R V F D A L V J J A R A T G Y E I I H X L Z Q J

Artificial Intelligence

Training

Testing

Prediction

Pattern

Machine

Learning

Feedback

Data

Algorithm

How AI Works

Across

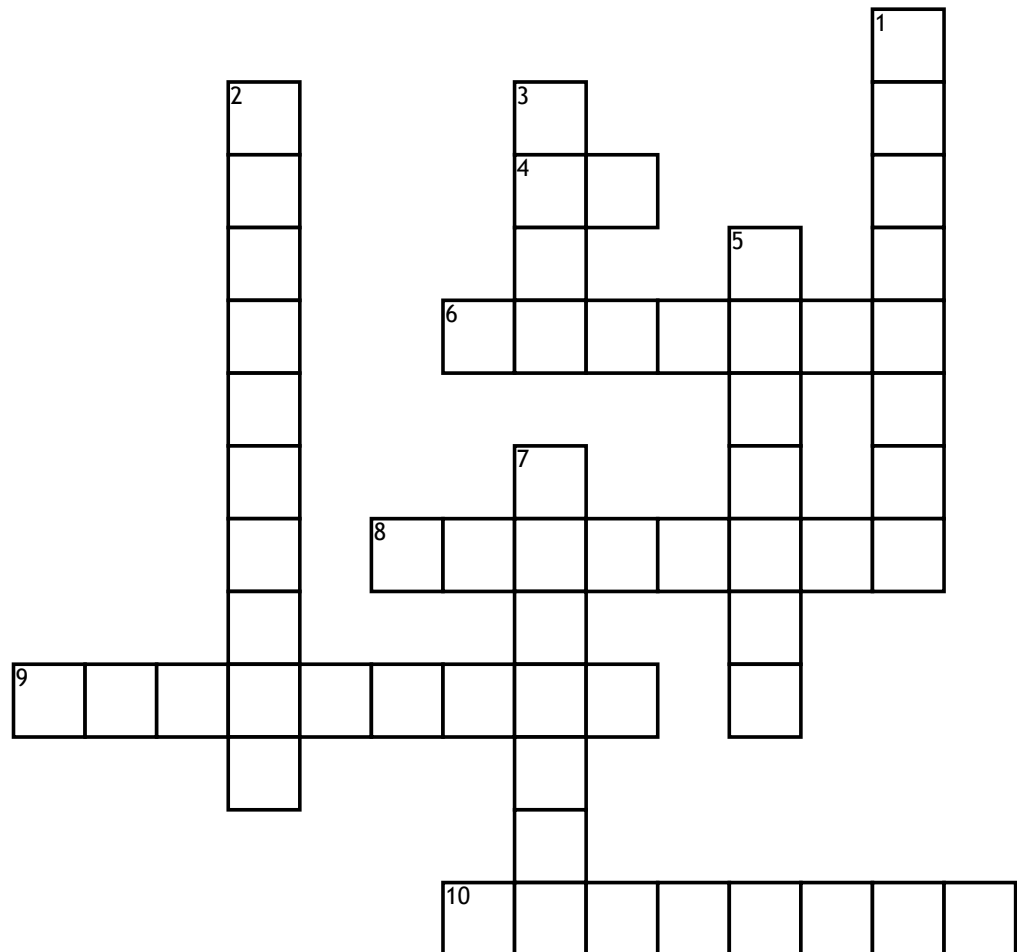
4. Technology that allows computers to perform tasks that normally require human intelligence, such as making decisions or recognizing patterns. (abbrv.)

6. A regular and repeating arrangement or sequence that AI systems can identify in data.

8. The process of showing an AI many examples so it can find patterns and learn to make accurate predictions.

9. A set of rules or step-by-step instructions that tell a computer how to solve a problem or complete a task.

10. Information about whether an AI's predictions are right or wrong, which helps it improve over time.



Down

1. The process where AI systems improve their performance by analyzing examples and adjusting their understanding.

2. A guess or forecast that an AI makes based on patterns it has learned from data.

3. Information that AI systems use to learn patterns and make predictions.

5. Checking how well an AI performs on new information it hasn't seen before.

7. A type of AI where computers learn from examples instead of being directly programmed for every situation.
____ Learning