

FREE PRINTABLE PACK · NO DEVICES NEEDED

AI and Computer Science Worksheets

2nd Grade

Ages 7–8

6 worksheets aligned to the 2026 CSTA PK–12 Computer Science Standards, with teacher notes and answer keys.

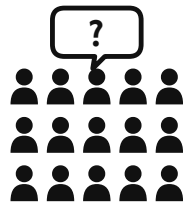
11



Train, Test, Fix

E2-ALG-ML-02 · AI

12



Fair Data Detectives

E2-DAT-IM-10 · AI

13



Inventors Through Time

E2-SOC-HI-14 · AI

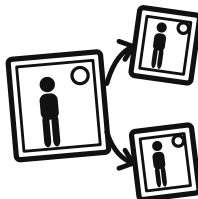
14



Problem Solvers

E2-SOC-HU-15 · AI

15



What Happens Next?

E2-SYS-SE-12 · Safety

16



Helpful or Harmful?

E2-SYS-IM-13 · Safety

- 12 student pages, black and white
- 6 answer keys

- 6 teacher notes pages
- A standards map for the whole set

What's inside

6 worksheets, one for each standard below. Each has a read-aloud box, so it works without a video.

Worksheet	Standard	Children learn	Pages
11 Train, Test, Fix AI Coaches	E2-ALG-ML-02 AI	How data trains an AI model	Student: 4–5 Notes: 16 Key: 22
12 Fair Data Detectives Survey Scouts	E2-DAT-IM-10 AI	Fair and unfair ways to collect data	Student: 6–7 Notes: 17 Key: 23
13 Inventors Through Time History Hunters	E2-SOC-HI-14 AI	Inventors from many places and times	Student: 8–9 Notes: 18 Key: 24
14 Problem Solvers Tech Reporters	E2-SOC-HU-15 AI	How people made tech to solve problems	Student: 10–11 Notes: 19 Key: 25
15 What Happens Next? Click Captains	E2-SYS-SE-12 Safety	Online actions have real-world results	Student: 12–13 Notes: 20 Key: 26
16 Helpful or Harmful? Balance Builders	E2-SYS-IM-13 Safety	Benefits and harms of using tech	Student: 14–15 Notes: 21 Key: 27

How to use this pack

- Print at 100% (“Actual size”) on US Letter. On A4, choose “Fit to page”.
- Student pages come first, two per worksheet. Teacher notes and answer keys are at the back, in the same order.
- Each worksheet takes about 25–30 minutes (our estimate, not yet tested in class).
- Children need a pencil and crayons. No scissors or devices needed.
- **AI** means CSTA tags the standard as AI-related. **Safety** means privacy and responsible use.

Standard codes © CSTA, csteachers.org/pk12standards (CC BY-NC-SA 4.0). The summaries are ours.

16 worksheets, Pre-K to 2nd grade

Every worksheet, matched to its 2026 CSTA standard, the nearest year group in England and any matching Learn with Karyn video. This pack's rows are shaded.

Standard	Children learn	Our worksheet	Learn with Karyn video	England
Pre-K & Kindergarten pack · ages 4–6				
EK-ALG-ML-02 AI	Sort things into groups using clues	1. Sort It Out!	Ep. 1: What Is a Computer?	Reception & Year 1
EK-SOC-HI-14 AI	Spot how everyday tools changed over time	2. Then and Now	—	Reception & Year 1
EK-SOC-HU-15 AI	People plan, build and test machines	3. People Make Machines	Ep. 1: What Is a Computer?	Reception & Year 1
EK-SYS-SE-12	Tell private information from OK-to-share	4. Private or OK to Share?	—	Reception & Year 1
EK-SYS-IM-13	Use tech in kind, careful ways	5. Kind and Careful with Tech	—	Reception & Year 1
1st Grade pack · ages 6–7				
E1-ALG-ML-02 AI	How AI uses patterns in data	6. How AI Uses Patterns	Ep. 2: What Is Smart Technology?	Year 2
E1-SOC-HI-14 AI	How an everyday activity changed with new tech	7. Before and After	Ep. 2: What Is Smart Technology?	Year 2
E1-SOC-HU-15 AI	What people and computers each do well	8. People Are Great At...	—	Year 2
E1-SYS-SE-12	Keep devices and accounts locked	9. Keep It Locked	—	Year 2
E1-SYS-IM-13	My jobs when I use tech	10. My Tech Job	—	Year 2
2nd Grade pack · ages 7–8				
E2-ALG-ML-02 AI	How data trains an AI model	11. Train, Test, Fix	—	Year 3
E2-DAT-IM-10 AI	Fair and unfair ways to collect data	12. Fair Data Detectives	—	Year 3
E2-SOC-HI-14 AI	Inventors from many places and times	13. Inventors Through Time	—	Year 3
E2-SOC-HU-15 AI	How people made tech to solve problems	14. Problem Solvers	—	Year 3
E2-SYS-SE-12	Online actions have real-world results	15. What Happens Next?	—	Year 3
E2-SYS-IM-13	Benefits and harms of using tech	16. Helpful or Harmful?	—	Year 3

Standard codes © CSTA, csteachers.org/pk12standards (CC BY-NC-SA 4.0); the summaries are ours. **AI** marks standards CSTA tags as AI-related. England years are the nearest match by age. Videos and more free worksheets: changetheworldwithkaryn.com.

Train, Test, Fix

Name _____

 I can explain how data trains an AI model and how better data fixes it.

READ ALOUD

To train an AI model, people give it lots of examples with labels, like “cat” and “not a cat.” This is called **training data**. The model looks for patterns in the examples. Then people **test** it with new pictures. If it makes mistakes, they **fix** it, often by adding better examples.

1 Train: look at the training data

This model is learning to spot cats. Look at its training data, then circle the answers.

TRAINING DATA



cat



cat



not a cat



cat



not a cat



not a cat

1. All the cats in the training data are

black

white

2. All the not-cats are

black

white

3. So the model may learn a wrong pattern: black means

cat

not a cat

2 Test: be the model

Guess like the model, using its pattern. Then circle **yes** if the guess is right.



a white cat

The model guesses:

cat

not a cat

Is it right?

yes

no



a black kitten

The model guesses:

cat

not a cat

Is it right?

yes

no



a white duck

The model guesses:

cat

not a cat

Is it right?

yes

no



a black dog

The model guesses:

cat

not a cat

Is it right?

yes

no

Train, Test, Fix

page 2

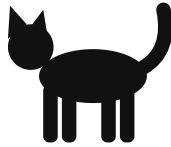
Name _____

3 Fix: choose better data

Circle the 3 pictures that would help the model learn what really makes a cat.



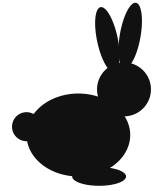
a striped cat



one more black cat



a spotted cat



a black rabbit

Your turn! Draw one more helpful training picture. Label it **cat** or **not a cat**.**NEW TRAINING PICTURE**

4 Show what you know

Answer both boxes.

Number the steps in order: 1, 2, 3.



TEST

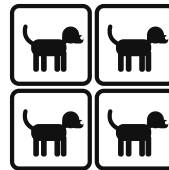
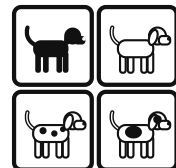


FIX



TRAIN

Which training data is better for teaching a model what a dog is? Circle one.

the same black dog
again and again

lots of different dogs

How did I do? Color a face.

I can do it!



Almost!



I need help.

Did you know?

Some AI models train on millions of examples. People still test them to find and fix mistakes!

Fair Data Detectives

Name _____

 I can tell fair ways to collect data from unfair ones.

READ ALOUD

Data is information we collect, like answers to a question. How we collect it matters! If we ask only some people, let some people answer many times or ask a tricky question, the data can give a wrong or unfair answer. AI learns from data too, so fair data helps AI work well for everyone.

1

Fair or not fair?

A class wants to find its favorite fruit. Circle **Fair** or **Not fair** for each way.



 Fair

 Not fair



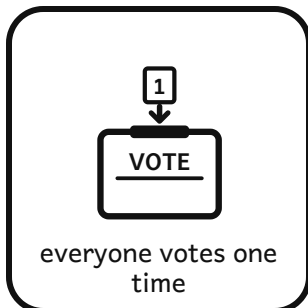
 Fair

 Not fair



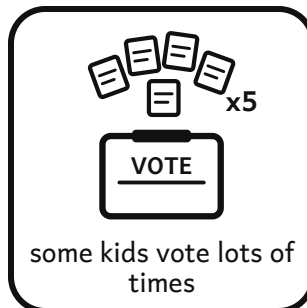
 Fair

 Not fair



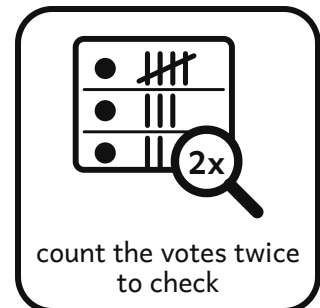
 Fair

 Not fair



 Fair

 Not fair



 Fair

 Not fair



Talk with a partner: Why is asking only the apple line not fair?

Fair Data Detectives

page 2

Name _____

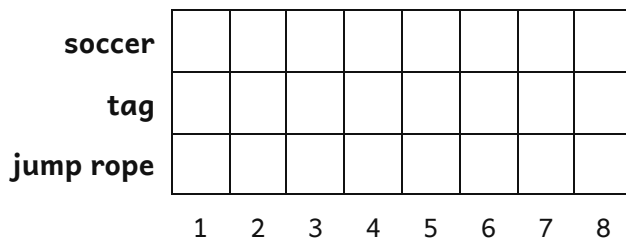
2 Be a data detective

Look at Mia's data. Color the graph, then answer.



Game	Votes
soccer	
tag	
jump rope	

Color one box for each vote.



1. How many more kids chose soccer than tag?

2. Mia says, "Everyone at our school loves soccer best!" Is her data fair?

☐ Fair

☐ Not fair

3. Why? Circle one. ☐ She asked only at the soccer field.

☐ She asked all over the school.

A fairer way to collect the data: _____

3 Show what you know

Circle one in each box.

A voice app learned only from grown-ups' voices. What might happen?



☐ It may not understand kids.

☐ It will understand everyone.

Which question is fairer to ask?

☐ "Don't you think dogs are the best pet?"

☐ "What is your favorite pet?"

How did I do? Color a face.



I can do it!



Almost!



I need help.

Did you know?

Scientists try to ask many different kinds of people, so their answers are fair for everyone.

Inventors Through Time

Name _____



I can tell how people from different places and times made computing tools to solve problems and share ideas.



READ ALOUD

People in many places and times have designed tools to help us count, remember and share. Some solved problems, like hard math. Some helped people share ideas and feelings. Some even help AI learn! Let's meet some inventors.

1 Meet the inventors

Read each card. Write a word from the word bank on each line. Use each word once.

WORD BANK

music

numbers

AI

math

messages

space

1

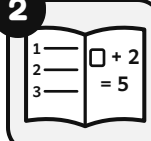


Shigetaka Kurita

Japan · 1999

He designed 176 emoji, tiny pictures to send in _____ on phones.

2



Muhammad al-Khwarizmi

Baghdad, in today's Iraq · 800s

He wrote step-by-step ways to solve _____ problems. *Algorithm* is named after him.

3

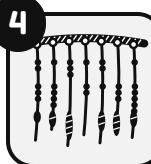


Katherine Johnson

NASA, USA · 1962

Astronaut John Glenn asked her to check the computer's numbers before his trip into _____.

4



Inca khipu keepers

Andes, South America · 1400s–1500s

They tied knots in strings to keep track of _____, like how many people lived in a town.

5



Fei-Fei Li

USA · 2009

Her team made ImageNet, millions of labeled photos. It helps _____ learn what is in a picture.

6



Ada Lovelace

England · 1843

She published the first steps for a computing machine, and imagined it making _____.



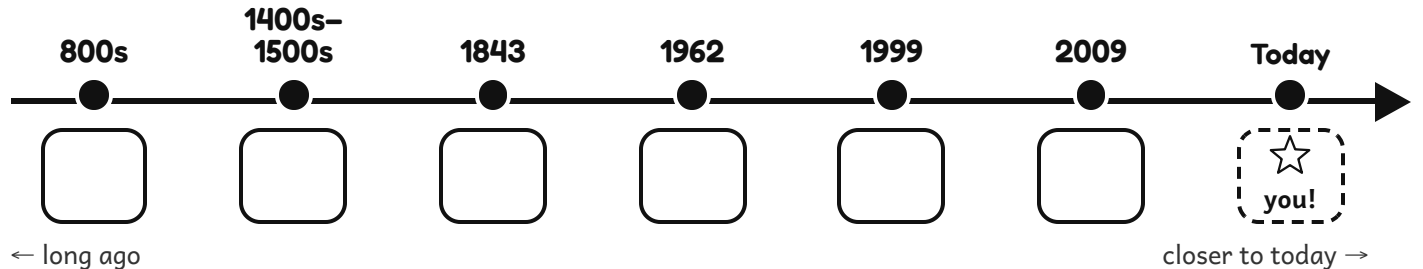
Talk with a partner: Which tool would you most like to try? Why?

Inventors Through Time page 2

Name _____

2 Put them in time order

Find each time on a card from page 1. Write that card's number in the box.

**3 Make your own inventor card**

You can be an inventor too! Draw a tool that would help your family or community. Then fill in your card.

Draw your tool here.

Inventor: _____

 Place: _____ Year: _____

 My tool helps people _____

4 Show what you know

Circle one in each box.

Who can design computing tools?

Only people from long ago

People from every place and time

Why did Katherine Johnson check the computer's numbers?

To help keep the astronaut safe

To make the computer go faster

How did I do? Color a face.

I can do it!



Almost!



I need help.

Did you know?

Emoji is a Japanese word: *e* means picture and *moji* means letter. It doesn't come from the word *emotion*!

Problem Solvers

Name _____

 I can investigate how people made computing tools to solve real problems.

 READ ALOUD

Problem solvers notice when something is hard for people. They ask: Who has the problem? What makes it hard? Then they design a tool, test it with those people and make it better. Many tools are computers, and some use AI.

1 Investigate a problem solver

Read the case file. Then answer the reporter questions. Circle or write.



Case file: Saqib Shaikh

Saqib Shaikh lost his sight when he was 7. At 10, he got a computer that could talk, and he learned to write programs. He grew up to write programs for his job. Reading signs and menus can be hard for people who are blind. So Saqib and his team made a free phone app called Seeing AI. Point the phone's camera, and the app uses AI to read words out loud and tell what it sees.

1 Who had the problem?

people who can't hear

people who are blind

people who are lost

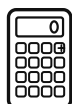
2 What was hard for them?

reading signs and menus

running fast

hearing music

3 What did Saqib's team make?



a calculator



a video game



a phone app
that talks

4 How does it help?

It helps people by

Reporter's question: If I could ask Saqib one thing, I would ask _____

Problem Solvers

page 2

Name _____

2 Match the problem to the tool

Draw a line from each problem to the tool people made to help.



Grandpa lives far away. He wants to see the new baby.



A girl who is deaf wants to know what people in a video say.



Two new friends speak different languages.



A family is lost in a big city.



map app



translation app



video call



captions

3 Your turn: be a problem solver

Think of something hard for someone at school or home. Plan a tool to help.

Who has the problem? _____

What is hard? _____

Who should test my tool? _____

Draw your tool here.

4 Show what you know

Circle one in each box.

What do problem solvers do first?

Start building right away

Find out who has the problem

Who should test Seeing AI?

People who are blind

People who never use it

How did I do? Color a face.



I can do it!



Almost!



I need help.

Did you know?

Saqib first thought of his app idea at university. Years later, he and his team made it real!

What Happens Next?

Name _____



I can explain how things I do online can make real things happen.

READ ALOUD

What we do online doesn't stay inside the screen. A message can make a real person happy or sad. A tap can spend real money. A photo can be copied and shared, and it can be hard to take back. So before you click, post or share, stop and think: What happens next?

1

What happens next?

Read each story. Circle what happens next in real life.



Priya taps “Buy 500 gems” in a game without asking.



The gems are free, so nothing happens.

A grown-up's real money is spent.



Leo sends a kind message to a friend who is sick.



His friend smiles and feels a bit better.

Nothing happens, because it's only online.



Jamal types his home address in a game chat.



People he doesn't know could find out where he lives.

Only Jamal can ever see it.



Zara posts a silly photo of her friend without asking.



The photo disappears when the app closes.

Her friend may feel upset, and others can copy the photo.



Talk with a partner: Which story's “next” could be hard to take back? Why?

What Happens Next?

page 2

Name _____

2 Stop and think

Ask the three questions. Yes to any? Circle **Stop**. No to all three? Circle **Go**.



Could it share private information?



Could it cost money?



Could it hurt someone's feelings?



Send Grandma a birthday video.

Go

Stop



Type your school's name in a game chat.

Go

Stop



Click a pop-up that says "You won!"

Go

Stop



Share your drawing in the class app your teacher set up.

Go

Stop



Post a mean joke about a classmate.

Go

Stop



Look up how bees make honey, with a grown-up.

Go

Stop

3 My online action

Draw something you do online. Then draw what happens next in real life.

I do this online:

Then this happens in real life:



When I _____ online, _____

4 Show what you know

Circle one in each box.

Zara deletes the photo. Is it gone for sure?

Yes, it's gone everywhere.

Maybe not. Someone may have copied it.

AI chat apps may save what you type. What should you keep private?

My home address

My favorite color

How did I do? Color a face.



I can do it!



Almost!



I need help.

Did you know?

Some phones and tablets can send a grown-up a request before a child buys anything. The grown-up says yes or no.

Helpful or Harmful?

Name _____

 I can describe how using tech can help people and how it can harm them.

READ ALOUD

Tech can help us in lots of ways. We can learn, make things, find our way and talk to people far away. But how we use tech matters. Using it too loud, too late or when we should be looking around can cause harm. Helpful or harmful? It depends on how we use it!

1

Helpful or harmful?

Look at how each person uses tech. Circle **Helpful** or **Harmful**.



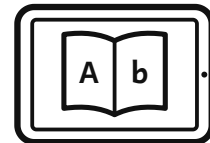
Video-calling a cousin who lives far away

☒ Helpful

☐ Harmful


Playing a game in bed late at night

☒ Helpful

☐ Harmful


Practicing reading with a reading app

☒ Helpful

☐ Harmful


Listening with headphones turned up very loud

☒ Helpful

☐ Harmful


Looking at a phone while crossing the street

☒ Helpful

☐ Harmful


Using a map app to find the library

☒ Helpful

☐ Harmful


Talk with a partner: How does tech help you every day?

Helpful or Harmful?

page 2

Name _____

2 One tool, two sides

Read the example. Then pick a tool and write how it can help and how it can harm.



EXAMPLE: A PHONE CAMERA

✓ It can help me save special moments with my family.

⚠ It can harm someone if I post someone's photo without asking.

Draw your tool here.

My tool: _____

✓ It can help by _____

⚠ It can harm if _____

3 Make it helpful

Circle the helpful choice for each one.

Omar plays a video game all afternoon and skips playing outside.

Keep playing until dinner.

Take a break and play outside.

Lily asks an AI helper a question and copies the answer without checking.

Check it in a book or with a grown-up.

Copy it. Computers are never wrong.

4 Show what you know

Circle one answer for each question.

1. Is a video game helpful or harmful?

Always harmful

It depends on how we use it

2. What is a helpful way to use headphones?

Keep the volume low

Turn it all the way up

How did I do? Color a face.



I can do it!



Almost!



I need help.

Did you know?

Doctors say to turn screens off an hour before bed. It helps you fall asleep!

Teacher Notes

Train, Test, Fix: AI Coaches · 2nd Grade (ages 7–8)

Standard	2026 CSTA PK–12 Computer Science Standards, E2-ALG-ML-02 (Algorithms & Design: Machine Learning), tagged AI-related by CSTA
Also practices	Common Core RI.2.3 (connect the steps in a technical procedure) · SL.2.1 (partner talk)
Time and materials	About 25–30 minutes (our estimate, not yet tested in class). Student pages per child, a pencil and crayons. No scissors or devices needed.
Printing	US Letter at 100% (“Actual size”). On A4, choose “Fit to page”. Answer keys are at the back.

The standard in plain words

Children look closely at how data trains a machine learning model: people give it labeled examples, it finds patterns, people test it on new examples and fix mistakes, often by adding the kinds of examples that were missing.

What it asks at this age

- Training data is a set of labeled examples.
- A model learns whatever pattern its data shows, even a wrong one.
- Testing finds mistakes; better, more varied data fixes them.

What it doesn't ask yet

- How a model changes when new data is added (3rd grade, E3-ALG-ML-02).
- Training a real model (5th grade, E5-ALG-ML-02).
- How data is collected fairly (see worksheet 12, E2-DAT-IM-10).

Good to know: this is a simple model of a real idea. Real AI looks at many clues at once, not just color. The big idea holds: a model only knows what its training data shows it, so missing examples lead to mistakes.

Standard code © CSTA, csteachers.org/pk12standards (CC BY-NC-SA 4.0). The plain-words version and the two lists are our reading of the standard; CSTA's own clarification is on its site.

How to teach it

1. **Warm up (3 minutes).** “How would you teach someone what a cat is, using only pictures?”
2. **Read aloud** the box on page 1.
3. **Train and test.** Children circle the pattern, then guess like the model.
4. **Fix.** Children circle better data and draw one more example.
5. **Show what you know** is your quick check. Then children color a face.

Talk prompts

- “Why did the model call the black dog a cat?” It learned black means cat.
- “Would one more black cat help?” No. It shows the same pattern again.
- “What really makes a cat a cat?” Pointy ears, whiskers, a long tail.

Support and stretch

Support: Play it live. One child is the model and learns only from the cards you show.

Stretch: Plan training data for a dog finder. What dogs and not-dogs would you include?

Why it's AI learning

This is machine learning in miniature: data in, a pattern learned, a test, a fix. Seeing that a model only knows what its data shows prepares children for fair data (worksheet 12) and later grades.

For teachers in England

2nd grade matches Year 3. Links to KS2 computing (“detect and correct errors in algorithms and programs”). The new curriculum, first taught from September 2028, adds how computers are trained using data.

Teacher Notes

Fair Data Detectives: Survey Scouts · 2nd Grade (ages 7–8)

Standard	2026 CSTA PK–12 Computer Science Standards, E2-DAT-IM-10 (Data & Analysis: Impacts of Data Science), tagged AI-related by CSTA
Also practices	Common Core 2.MD.D.10 (bar graph, up to four groups; how many more) · SL.2.1 (partner talk)
Time and materials	About 25–30 minutes (our estimate, not yet tested in class). Student pages per child, a pencil and crayons. No scissors or devices needed.
Printing	US Letter at 100% (“Actual size”). On A4, choose “Fit to page”. Answer keys are at the back.

The standard in plain words

Children tell apart ways of collecting data and spot the ones that can give wrong or unfair answers: asking only some people, letting some people answer many times or asking a question that pushes people to one answer.

What it asks at this age

- Fair data asks many different people the same clear question, once each.
- Asking only some people, or only in one place, can tip the answer.
- Checking counts and asking clear questions keep data accurate.

What it doesn't ask yet

- Words like sample and bias. “Fair” and “not fair” are enough for now.
- Designing big surveys or using spreadsheets.
- Fixing unfair data inside an AI model.

Good to know: unfair data is usually an accident. We ask whoever is nearby. The skill is noticing who is missing, not blaming anyone.

Standard code © CSTA, csteachers.org/pk12standards (CC BY-NC-SA 4.0). The plain-words version and the two lists are our reading of the standard; CSTA's own clarification is on its site.

How to teach it

1. **Warm up (3 minutes).** “If we asked only kids at the soccer field what game is best, what would they say?”
2. **Read aloud** the box on page 1.
3. **Fair or not fair?** Children circle a chip for each card, then talk with a partner.
4. **Be a data detective.** Children color the graph, judge Mia's data and write a fairer way.
5. **Show what you know** is your quick check. Then children color a face.

Talk prompts

- “Who is missing from this data?”
- “Does the question push people to one answer?”
- “What if an AI learns from unfair data?” It may work better for some people than others.

Support and stretch

Support: Run a real class vote two ways: ask one table, then everyone, and compare.

Stretch: Children write a fair survey question, ask the whole class and make a bar graph.

Why it's AI learning

AI learns from data. If the data comes from only some people, the AI can work worse for others. A voice tool that learned mostly from grown-ups, for example, may struggle with children's voices.

For teachers in England

2nd grade matches Year 3. Fits KS2 computing (“collecting, analysing, evaluating and presenting data and information”). Check the exact wording on gov.uk.

Teacher Notes

Inventors Through Time: History Hunters · 2nd Grade (ages 7–8)

Standard	2026 CSTA PK–12 Computer Science Standards, E2-SOC-HI-14 (Computing & Society: History of Computing), tagged AI-related by CSTA
Also practices	C3 Framework D2.His.1.K-2 (put events in time order) · Common Core RI.2.1 (who, what, where, when, why and how questions about a text)
Time and materials	About 25–30 minutes (our estimate, not yet tested in class). Student pages per child, a pencil and crayons. No scissors or devices needed.
Printing	US Letter at 100% (“Actual size”). On A4, choose “Fit to page”. Answer keys are at the back.

The standard in plain words

Children learn that people from many cultures, backgrounds and times have designed computing tools, from knotted strings to AI, to solve problems and share ideas.

What it asks at this age

- Computing tools come from many kinds of people, places and times.
- Each tool met a need: solving a problem or sharing an idea.
- Tools and ideas can be put in time order.

What it doesn't ask yet

- Memorizing names or dates.
- How each tool works inside.
- Investigating a problem and designing a fix (worksheet 14, E2-SOC-HU-15).

Good to know: the pictures show each idea simply, not the real object. For example, the machine Ada Lovelace wrote about, Charles Babbage’s Analytical Engine, was designed but never built.

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How to teach it

1. **Warm up (3 minutes).** “What helps you count or remember things?” (Fingers, a calendar, a phone.)
2. **Read aloud** the box on page 1.
3. **Meet the inventors.** Read the cards together. Children fill each blank from the word bank.
4. **Time order.** “800s” means the years 800 to 899. The timeline is in order, not to scale.
5. **Inventor card** and **Show what you know.** Then children color a face.

Talk prompts

- “What problem did this tool solve, or what idea did it share?”
- “Who used it, and where?”
- “Which tools are still used today?”

Support and stretch

Support: Read the cards in pairs and do one card at a time, starting with the word bank word you know.

Stretch: Children research another inventor, such as Grace Hopper or Jerry Lawson, and make a card for the timeline.

Why it's AI learning

AI has a history too. ImageNet’s millions of labeled photos let researchers train and test AI that tells what is in a picture. It links to training data (worksheet 11) and fair data (worksheet 12).

For teachers in England

2nd grade matches Year 3. The al-Khwarizmi card links to KS2 history (“early Islamic civilization, including a study of Baghdad c. AD 900”). Check the exact wording on gov.uk.

Teacher Notes

Problem Solvers: Tech Reporters · 2nd Grade (ages 7–8)

Standard	2026 CSTA PK–12 Computer Science Standards, E2-SOC-HU-15 (Computing & Society: Humans & Computing), tagged AI-related by CSTA
Also practices	NGSS K-2-ETS1-1 (gather information about a situation people want to change, to define a simple problem) · Common Core RI.2.1 (who, what, where, when, why and how questions)
Time and materials	About 25–30 minutes (our estimate, not yet tested in class). Student pages per child, a pencil and crayons. No scissors or devices needed.
Printing	US Letter at 100% (“Actual size”). On A4, choose “Fit to page”. Answer keys are at the back.

The standard in plain words

Children investigate real situations where people made computing tools to solve problems: who had the problem, what was hard, what people made and how it helps. Then they try planning a tool of their own.

What it asks at this age

- Start with people: who has the problem and what is hard for them.
- People design computing tools, including AI tools, to help.
- Good tools are tested with the people they are for.

What it doesn't ask yet

- Building or coding a real tool.
- How AI reads words or spots things in a picture.
- Weighing helpful and harmful uses (worksheet 16, E2-SYS-IM-13).

Good to know: talk about disability with respect. Use words like “people who are blind” and focus on what people do. Many people who are blind use phones and computers every day.

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How to teach it

1. **Warm up (3 minutes).** “What is hard for someone at our school? Who is it hard for?”
2. **Read aloud** the box on page 1, then the case file.
3. **Investigate.** Children answer the reporter questions and write their own question.
4. **Match.** Ask “Who has this problem?” before children draw each line.
5. **Your turn and Show what you know.** Then children color a face.

Talk prompts

- “Who has this problem? What makes it hard?”
- “What did people make, and how does it help?”
- “How could you test your tool with the people it’s for?”

Support and stretch

Support: Act out one problem and its tool with a partner before matching.

Stretch: Children interview someone at school about something that is hard, then share a tool idea.

Why it's AI learning

Many problem-solving tools use AI. Seeing AI reads printed words and describes what the camera sees, and many caption and translation tools use AI too. People design AI to solve people’s problems.

For teachers in England

2nd grade matches Year 3. Fits KS2 design and technology: researching and designing products “aimed at particular individuals or groups” (checked on gov.uk).

Teacher Notes

What Happens Next? Click Captains · 2nd Grade (ages 7–8)

Standard	2026 CSTA PK–12 Computer Science Standards, E2-SYS-SE-12 (Systems & Security: Security). CSTA does not tag it as AI-related.
Also practices	ISTE Standards for Students 1.2.a (the lasting impact of online behaviors on themselves and others) · CASEL responsible decision-making
Time and materials	About 25–30 minutes (our estimate, not yet tested in class). Student pages per child, a pencil and crayons. No scissors or devices needed.
Printing	US Letter at 100% (“Actual size”). On A4, choose “Fit to page”. Answer keys are at the back.

The standard in plain words

Children explain how things they do online, like tapping, typing, posting and sending, make real things happen: to people’s feelings, to money and to safety. Some results are good, some are not, and some are hard to undo.

What it asks at this age

- Online actions have real results for feelings, money and safety.
- Some results last: posts can be copied and shared.
- Stop and think before you click, post or share.

What it doesn’t ask yet

- How the internet moves information.
- Setting up accounts or privacy settings alone.
- Weighing helpful and harmful uses (worksheet 16, E2-SYS-IM-13).

Good to know: calm, not scary. Most things children do online are fine. The goal is a habit of pausing. Tell children they can always tell a grown-up if something online goes wrong, and they won’t be in trouble for telling.

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How to teach it

1. **Warm up (3 minutes).** “Can a tap on a tablet change something in real life?”
2. **Read aloud** the box on page 1.
3. **What happens next?** Read each story together. Children circle, then talk with a partner.
4. **Stop and think.** Model the three questions on one card, then children circle Go or Stop.
5. **My online action** and **Show what you know.** Then children color a face.

Talk prompts

- “What happens next, in real life?”
- “Who could see this? Could it be copied?”
- “Which of the three questions fits?”

Support and stretch

Support: Act out each story as “First... next...” before children circle.

Stretch: Children make a class poster of the three stop-and-think questions.

Why it matters for AI

AI chat apps and smart speakers may save what you type or say, so the three questions apply to them too. Keep private information out of AI chats, and ask a grown-up before using an AI app.

For teachers in England

2nd grade matches Year 3. Fits KS2 computing (“use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact”).

Teacher Notes

Helpful or Harmful? Balance Builders · 2nd Grade (ages 7–8)

Standard	2026 CSTA PK–12 Computer Science Standards, E2-SYS-IM-13 (Systems & Security: Impacts of Computing Systems). CSTA does not tag it as AI-related.
Also practices	ISTE Standards for Students 1.2.c (being intentional about what they do online and how much time they spend online) · Common Core SL.2.1 (partner talk)
Time and materials	About 25–30 minutes (our estimate, not yet tested in class). Student pages per child, a pencil and crayons. No scissors or devices needed.
Printing	US Letter at 100% (“Actual size”). On A4, choose “Fit to page”. Answer keys are at the back.

The standard in plain words

Children describe the good and bad results of how a person uses tech. Tech helps us learn, connect and get around, and the same tools can cause harm when used too loud, too long, too late or without looking around.

What it asks at this age

- The same tool can help or harm. It depends on how it is used.
- Benefits: learning, making, connecting and finding our way.
- Harms can be to sleep, ears, safety, time or other people.

What it doesn't ask yet

- Exact screen-time limits (a family and school choice).
- Effects on whole communities or the planet.
- How online actions spread (worksheet 15, E2-SYS-SE-12).

Good to know: tools aren't good or bad by themselves. The same tablet can teach reading or keep a child up at night. Praise helpful habits, and keep talk about harms practical, not scary.

Standard code © CSTA, csteachers.org/pk12standards (CC BY-NC-SA 4.0). The plain-words version and the two lists are our reading of the standard; CSTA's own clarification is on its site. Health facts checked in October 2026 with the American Academy of Pediatrics (screens off an hour before bed) and the World Health Organization (keep the volume down).

How to teach it

1. **Warm up (3 minutes).** “What tech did you use yesterday? How did it help?”
2. **Read aloud** the box on page 1.
3. **Helpful or harmful?** Children circle a chip for each card, then talk with a partner.
4. **One tool, two sides.** Read the camera example together, then children pick a tool.
5. **Make it helpful** and **Show what you know.** Then children color a face.

Talk prompts

- “How does this help? Could it ever harm?”
- “Who could be harmed: me, someone else or the device?”
- “How could we make it helpful?”

Support and stretch

Support: Make a class T-chart, helpful and harmful, with pictures before children work alone.

Stretch: Children make a “helpful tech” tip card to share at home.

Why it matters for AI

AI tools have two sides too. An AI helper can explain things or read aloud, but it can also be wrong or make things up. A helpful habit, as in Lily's story: check AI answers with a book or a grown-up.

For teachers in England

2nd grade matches Year 3. Fits KS2 computing, which covers using technology “safely, respectfully and responsibly” and the internet and “the opportunities they offer for communication and collaboration” (checked on gov.uk).

Answer Key

Train, Test, Fix: AI Coaches · 2nd Grade

Computer science · AI
Standard E2-ALG-ML-02

Page 1: Train and test

Train: 1. **black** · 2. **white** · 3. **cat**. Every cat is black and every not-cat is white, so the model may learn “black means cat.”



a white cat
guess: **not a cat**
right? **no**



a black kitten
guess: **cat**
right? **yes**



a white duck
guess: **not a cat**
right? **yes**



a black dog
guess: **cat**
right? **no**

Test: the model is wrong twice. It misses the white cat and calls the black dog a cat.

Page 2: Fix



a striped cat



one more black cat



a spotted cat



a black rabbit

The ringed pictures break the wrong pattern: cats that aren't black, and a not-cat that is black. One more black cat changes nothing. **Your turn:** any non-black cat or black not-cat, labeled correctly.

Page 2: Show what you know

NUMBER THE STEPS



TEST

Test: 2



FIX

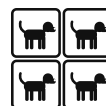
Fix: 3



TRAIN

Train: 1

BETTER DATA FOR A DOG FINDER



the same black dog again and again



lots of different dogs

Train, then test, then fix. Lots of different dogs teach the model what all dogs share.

Read the guesses

Children who answer “the white cat is a cat” are right about cats but not about the model. Ask: “What would the model guess?”

How did I do?

Any face is fine. The faces show you who may want another try, perhaps playing the model game first.

Answer Key

Fair Data Detectives: Survey Scouts · 2nd Grade

Computer science · AI
Standard E2-DAT-IM-10

Page 1: Fair or not fair?

FAIR (3)



ask everyone in the class



everyone votes one time

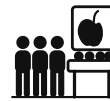


count the votes twice to check

NOT FAIR (3)



ask only your best friends



ask only kids in the apple line



some kids vote lots of times

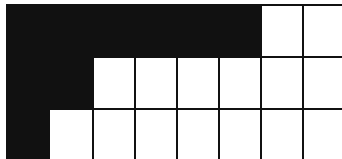
Fair ways ask everyone, once, and check the count. **Talk with a partner:** kids in the apple line probably like apples, so the answer tips toward apples.

Page 2: Be a data detective

soccer (6)

tag (2)

jump rope (1)



1. 4 more kids chose soccer than tag (6 - 2).

2. Not fair.

3. She asked only at the soccer field.

A fairer way: ask kids from all over the school, one vote each, with the same question.

Page 2: Show what you know

A VOICE APP LEARNED ONLY FROM GROWN-UPS' VOICES. WHAT MIGHT HAPPEN?

It may not understand kids.

An AI that learned from only grown-ups may miss kids. A fair question doesn't push people toward one answer.

WHICH QUESTION IS FAIRER TO ASK?

"What is your favorite pet?"

If children say Mia is "bad"

Mia made an easy mistake: she asked the kids nearby. Ask: "Who did she miss?"

How did I do?

Any face is fine. The faces show you who may want another try, perhaps with a real class vote first.

Answer Key

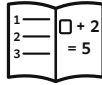
Inventors Through Time: History Hunters · 2nd Grade

Computer science · AI
Standard E2-SOC-HI-14

Page 1: Meet the inventors



1. messages



2. math



3. space



4. numbers



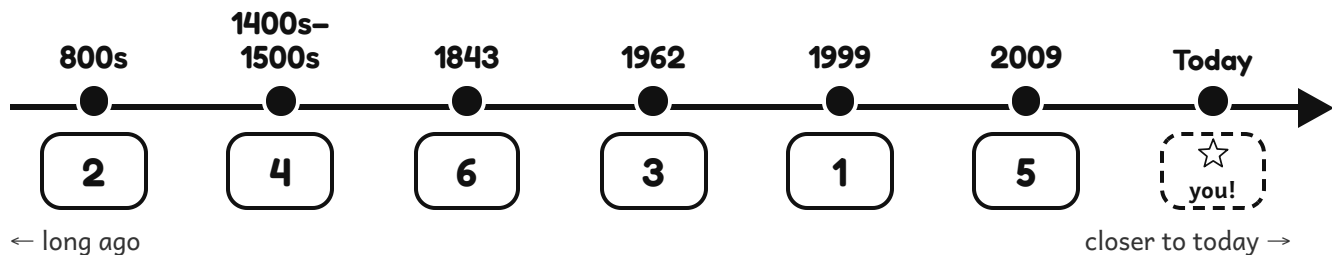
5. AI



6. music

Each word is used once. **Talk with a partner:** any tool and reason is fine.

Page 2: Put them in time order



The oldest is Muhammad al-Khwarizmi's math (800s). The newest is ImageNet (2009).

Page 2: Make your own inventor card

Any tool that helps people is fine. Check that the card names the inventor (the child), a place and this year, so it fits at the "Today" end of the timeline.

Page 2: Show what you know

WHO CAN DESIGN COMPUTING TOOLS?

People from every place and time

Inventors come from every place and time. Glenn asked Johnson to check the new computers' numbers before he would fly.

WHY DID KATHERINE JOHNSON CHECK THE COMPUTER'S NUMBERS?

To help keep the astronaut safe

If children ask, "Is a khipu a computer?"

Not an electronic one. It is a tool for keeping and counting information, like data, so it is part of the story of computing.

How did I do?

Any face is fine. The faces show you who may want another try, perhaps reading the cards with a partner.

Answer Key

Problem Solvers: Tech Reporters · 2nd Grade

Computer science · AI
Standard E2-SOC-HU-15

Page 1: Investigate a problem solver

1. Who had the problem? **people who are blind**
2. What was hard for them? **reading signs and menus**
3. What did Saqib's team make? **a phone app that talks**
4. For example: it reads words out loud, like signs and menus, and tells what the camera sees.
Any reporter's question is fine, for example "How did you test your app?"

Page 2: Match the problem to the tool



far away



video call



two languages



translation app



can't hear



captions



lost in a city



map app

For each line, ask "Who has the problem?"

Page 2: Your turn

Any problem and tool is fine. Check that the plan says who has the problem and what is hard, and that the tester is someone who has the problem.

Page 2: Show what you know

WHAT DO PROBLEM SOLVERS DO FIRST?

Find out who has the problem

Problem solvers start with the people who have the problem, and they test with them too.

WHO SHOULD TEST SEEING AI?

People who are blind

A common mix-up

Some children think people who are blind can't use phones. Many do, every day: phones and computers can read the screen out loud.

How did I do?

Any face is fine. The faces show you who may want another try, perhaps acting out the problems first.

Answer Key

What Happens Next? Click Captains · 2nd Grade

Page 1: What happens next?

Priya: A grown-up's real money is spent.

Leo: His friend smiles and feels a bit better.

Jamal: People he doesn't know could find out where he lives.

Zara: Her friend may feel upset, and others can copy the photo.

Talk with a partner: Zara's photo is the hardest to take back, because others can copy it.

Page 2: Stop and think

GO (3)



a birthday video

a drawing for
class

looking up bees

STOP (3)

a school name in
a chat

a prize pop-up



a mean joke

A school name in a chat: it could share private information. A prize pop-up: it could cost money or ask for private information. A mean joke: it could hurt someone's feelings.

Page 2: My online action

Any action with a real result is fine, good or not so good. For example: "When I send Dad a picture, he smiles" or "When I tap Buy, real money is spent."

Page 2: Show what you know

ZARA DELETES THE PHOTO. IS IT GONE FOR SURE?

Maybe not. Someone may have copied it.

AI CHAT APPS MAY SAVE WHAT YOU TYPE. WHAT SHOULD YOU KEEP PRIVATE?

My home address

If a child says, "I already did that!"

Thank them for telling you and stay calm. A grown-up can often delete a post, change a setting or report a problem.

How did I do?

Any face is fine. The faces show you who may want another try, perhaps acting out the stories first.

Answer Key

Helpful or Harmful? Balance Builders · 2nd Grade

Computer science · Safety
Standard E2-SYS-IM-13

Page 1: Helpful or harmful?

HELPFUL (3)



video call



reading app



map app

HARMFUL (3)



late-night game



loud headphones

phone while
crossing

Why harmful: A late-night game can cut into sleep, very loud sound can hurt ears and looking at a phone while crossing means you can't watch for cars. **Talk with a partner:** any helpful use is fine.

Page 2: One tool, two sides

Any tool is fine if the child names one way it helps and one way it can harm. For example: "A tablet can help by teaching me to read. It can harm if I use it late at night."

Page 2: Make it helpful

Omar: Take a break and play outside.

Lily: Check it in a book or with a grown-up.

Page 2: Show what you know

IS A VIDEO GAME HELPFUL OR HARMFUL?

It depends on how we use it

WHAT IS A HELPFUL WAY TO USE HEADPHONES?

Keep the volume low

If children say "all screens are bad"

Screens aren't good or bad by themselves. Ask: "What is it used for, and for how long?"

How did I do?

Any face is fine. The faces show you who may want another try, perhaps with the class T-chart first.