ANSWER KEY

Answer Key

Every page in this lesson is keyed. Nothing is left as "answers will vary."

Online games

Monster Club, about 9 to 12 minutes: madlyproductivepathways.com/play/monster-club

Ask afterward: How was following the owner's rule different from predicting the door machine?

One Morning, about 8 to 11 minutes: madlyproductivepathways.com/play/one-morning

Ask afterward: How did reading each machine's job help you decide between a written rule and a learned pattern?

Robot Repair Shop, about 7 to 9 minutes: madlyproductivepathways.com/play/robot-repair

Ask afterward: Why did Robo-Rule need a new rule while Robo-Learn needed new examples?

When: Use a game in addition to the lesson, as a finish-early task, homework or an extra period. Or use it instead of the paper activity. If a game replaces the paper activity, grade the lesson by its exit ticket.

The games play in the browser on a computer or tablet, with no account. They are not made for phones.

Bell Ringer — Which Ones Follow a Written Rule?

Look for

- Picks the storage warning and the 9 p.m. setting as plain rules.
- Says the other two come from patterns in examples rather than a rule somebody typed.

Model response

The storage warning and the 9 p.m. Do Not Disturb are plain rules, because somebody could write them as if this, then that. The face unlock and the next song came from a machine finding patterns in a lot of examples, and nobody wrote those rules out.

Also accept: Wording that says a person could type the first two out and could not type the other two.

Do not accept: An answer that calls all four artificial intelligence with no distinction.

When to give the point: Give the point for question 1 for naming the storage warning and the 9 p.m. setting, and for question 2 for any answer about patterns or examples rather than a written rule.

Guided Notes

Blanks are shown filled in, in order.

What does artificial intelligence mean?

A machine doing something we'd call thinking if a person did it is **artificial intelligence**. Deciding, sorting, recognizing and writing all count.

A set of steps a machine follows to get something done is an **algorithm**. Every program has one, and most algorithms have nothing to do with artificial intelligence.

Whatever you give a machine to work on is the **input**, and what it hands back is the **output**.

Facts, numbers, words, pictures and sounds a machine can work with are all **data**.

What's the first kind?

A machine that follows steps a person wrote out is **rule-based**. A thermostat turning the heat on below 68 degrees is rule-based.

If a written rule causes a mistake, a person can find that rule and change it.

A form that rejects an email address with no @ in it is rule-based. So is a spell checker that flags any word missing from its list.

One if-then rule on its own is just an ordinary program. A rule-based machine gets called AI when many written rules work together on a job that looks like thinking.

What's the second kind?

A machine that was shown a lot of examples and found the patterns in them is using **machine learning**. This is what people usually mean by AI now.

Something that repeats in the examples, which the machine can use on something new, is a **pattern**.

What the machine ends up with after all that, and what it uses to answer, is a **model**.

Nobody wrote the rule down, and often nobody can say it simply. That's the real difference between the two kinds.

Where do you already meet both?

Putting something into a group is what it means to **classify**. A phone deciding if a face is yours is classifying.

Unlocking with a face, a playlist picking the next song and a text about a strange charge on a card all use machine learning.

A password that must be eight characters, a curfew timer and a sale price that comes off at the register are all rule-based.

Some things use both. A bank checks fixed rules about your account and a learned model about how unusual a purchase looks.

Exit Ticket

1. Correct: (B) A person wrote out the steps it follows.

A rule-based machine follows steps a person wrote. If it's wrong, you can find that rule and change it.

2. Correct: (C) What a machine ends up with after finding patterns.

A model is what the machine ends up with after finding patterns in examples, and it's what the machine uses to answer.

Item 3 — written response

Look for

- Says a bumper rule is a written rule, not something learned.
- Says machine learning means finding patterns in examples.

Model response

No, because turning around at a wall is a rule somebody wrote. It would be machine learning if the vacuum had been shown a lot of examples and worked out the patterns itself, like learning which rooms get dirty fastest.

Also accept: Any answer that separates a rule a person wrote from a pattern a machine found.

Do not accept: An answer that says anything a machine does on its own is machine learning.

Points: give 1 point for each line under Look for, 2 in all.