



## ACTIVITY 1

# Types of Cognition

## INVESTIGATION

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## ACTIVITY SUMMARY

Students work through challenging brain-teaser questions to experience two different thinking modes. They evaluate their own metacognitive experiences by reviewing when they used fast thinking and slow thinking in the activity. The characteristics of both thinking modes are presented, and students consider how the two modes affect how people evaluate information and reach conclusions.

ACTIVITY TYPE  
INVESTIGATION

NUMBER OF  
40-50 MINUTE  
CLASS PERIODS  
1-2

## KEY CONCEPTS & PROCESS SKILLS

- 1 Slow thinking relies on careful reasoning and is useful for complex or higher-stakes situations. Slow thinking takes time and effort but is less prone to cognitive error when evaluating information and reaching conclusions.
- 2 Fast thinking is useful for straightforward or routine situations and relies on cognitive shortcuts. It is quick and automatic but can lead to flawed conclusions.

CONCEPTUAL  
TOOLS



## VOCABULARY DEVELOPMENT

### **cognition**

the set of mental processes that people use to interpret, imagine, and reason

### **slow thinking**

careful, reflective thinking that uses reasoning to reach conclusions

### **fast thinking**

quick, automatic thinking that uses shortcuts to reach conclusions

## TEACHER BACKGROUND INFORMATION

### **Modes of Cognition**

Cognition is a broad term for all the mental activities we use to gain knowledge and understand the world. This includes processes such as perception, attention, memory, learning, reasoning, and problem-solving. A mode of cognition is a distinct way or style of mental processing. Different cognitive approaches are better suited for different kinds of mental tasks—for example, solving an algebra problem versus writing a poem. Therefore, it is important to note that there are many modes of cognition used to solve problems or make sense of the world.

### **Fast Thinking and Slow Thinking**

One well-known model for how we think and process information uses two distinct modes of cognition: fast thinking and slow thinking. This concept was first described by Nobel Laureate Daniel Kahneman in 2011 as a result of decades of research with collaborator Amos Tversky. It is known as the dual-system theory of the mind and proposes two interactive modes of thinking: System 1, known as fast thinking, and System 2, known as slow thinking.

Fast thinking operates automatically, quickly, and often without conscious awareness. It is essential for handling the high volume of small decisions we need to make on a daily basis, such as what to wear or what to eat. Fast thinking relies on mental shortcuts called heuristics, which are rapid methods for reaching conclusions. This process has the benefit of being highly efficient and requiring little effort, but it can sometimes lead to errors because it bypasses the use of logical reasoning.

Slow thinking is the mode that requires effort, attention, and conscious control. It is more useful for complex situations, careful analysis, thoughtful decision-making, or when the risks of making an error are high, such as solving a difficult math problem or choosing a long-term medical plan. Slow thinking works by allocating resources to specific mental activities, often involving logical reasoning and step-by-step processing. While it has the benefit of reducing errors and leading to more accurate conclusions, it is less efficient and requires significant mental effort.

Both modes of cognition interact to shape our judgments and decisions. Fast thinking's reliance on heuristics is the source of cognitive biases. Slow thinking is necessary to reduce these errors but demands more cognitive resources, so it is used less frequently. Because of this constant trade-off between speed and accuracy, fast thinking and slow thinking constantly shape our judgments and decisions. People frequently shift between the two modes—using fast thinking for one part of a decision and slow thinking for another, even when working on the same problem.

## MATERIALS & ADVANCE PREPARATION

### FOR THE TEACHER

- VISUAL AID 1.1  
"Comparing Fast Thinking and Slow Thinking"
- VISUAL AID 1.2,  
"Understanding Conceptual Tools"  
(OPTIONAL)

### FOR EACH STUDENT

- STUDENT SHEET 1.1  
"Brain Teasers"
- STUDENT SHEET 1.2  
"Frayer Model"  
(OPTIONAL)
- STUDENT SHEET 1.3  
"Unit Concepts and Skills"  
(OPTIONAL)

In the Extension, students administer the brain teasers to friends and family. If you would like students to complete this task, prepare extra copies of the teasers for students to take home.

# TEACHING NOTES

Suggestions for **discussion questions** are highlighted in gold.

Strategies for the **equitable inclusion of diverse students** are highlighted in light blue.

## GETTING STARTED (10 MIN)

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### 1 Elicit students' reactions to the Introduction

- Have students read the Introduction and ask, **Have you ever experienced mixed messages on how to think as described in the Introduction?** Accept all responses at this time. This activity helps students explore modes of cognition through a direct experience. At this time, do not introduce students to concepts and vocabulary that will be introduced later in the activity. Therefore, keep the Introduction to the brain teasers to a minimum so students' initial approach to the questions are not influenced in advance.
- Engaging students about their experiences can create a stronger foundation for learning. Support students, particularly those with varied life experiences, in sharing their prior knowledge of and personal experiences with this issue. Specifically validate funds of knowledge—not just textbook knowledge, but also family or cultural insights, practices, and personal histories—by eliciting students' observations and experiences as assets to building understanding. Throughout this unit, encourage students to respond to any topics or questions that arise to which they feel a personal connection—during small-group or class discussions, when students respond to relevant Build Understanding items, and when they write reflections in their science notebooks.

## PROCEDURE SUPPORT (20 MIN)

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### 2 Students complete a set of brain teasers to experience two types of cognition.

- Hand out Student Sheet 1.1, “Brain Teasers,” and encourage students to work as fast as they can to complete the questions. It is important that students work through them quickly to encourage fast thinking. Consider using a timer (e.g., 5 minutes) to make it more likely that students will rely on fast thinking for their answers. Students should complete the questions on their own and not use the Internet to search for the answers.
- In Procedure Step 2, after students have completed the questions, review the correct answers as shown on the sample student response at the end of this activity. When students go back and review the questions slowly with a partner, encourage them to explain what they were thinking at the time. Make sure to let students know that their scores don’t matter; rather, the exercise is a way to think about their cognitive processes while answering the questions.
- For those students who would be more comfortable with simpler or more challenging questions, here are two additional questions, with accompanying reasoning, that can be added to or replace some of the brain-teaser questions:

#### Simpler:

I slither around,  
with my home on my back.  
I’ve never been rich,  
but I leave silver tracks.

What am I?

SNAKE    WORM    SNAIL    TURTLE

*The only animal that fits with all three pieces of information (slither, home on my back, and silver tracks) is the snail.*

#### More challenging:

If no babies are allergic to cats,  
and some people are allergic to cats,  
does it logically follow (imagine you know nothing else) that  
some people are not babies?

*No, it doesn’t logically follow. The tempting fast-thinking answer is yes, it follows, because the final claim is true, and all the other claims are plausible. But the correct answer is that it doesn’t follow because even though it’s true that some people are not babies, it is not logically implied by the two premises. It requires a third premise, namely, that babies are people.*

- When students share their experiences In Procedure Step 4, ask, **Which of the brain-teaser questions could someone easily make a mistake answering and why?** Students should recognize possible errors from at least 1 or 2 of the questions to prepare them for the next procedure step—for example, not stopping to do the math in Question 3 or not counting the number of nurses compared to doctors in the image for Question 5.

### 3 Introduce the characteristics of slow thinking and fast thinking.

- When students are introduced to slow thinking and fast thinking in Procedure Step 5, it is likely that they will identify that they engaged in fast thinking for Procedure Step 1 and slow thinking for Step 2. Discuss with students how some situations and prompts can encourage fast thinking, but often cognitive errors can be reduced by slowing down one's thinking.

#### Sample Student Response, Procedure Step 5

*For Question 5, I first used fast thinking because I just looked at the picture. For Question 3, I slowed my thinking down so I could do the math.*

- In Procedure Step 7, review Table 1.1: Characteristics of Fast Thinking vs. Slow Thinking before students move on to Procedure Step 8. This table provides more specific examples of how people engage in fast thinking and slow thinking. For more support differentiating between the two cognition modes, use Visual Aid 1.1, “Comparing Fast Thinking and Slow Thinking.” Review the provided examples and ask students to generate some of their own examples from daily life to formatively assess their understanding.

**TEACHER’S NOTE:** The description of slow thinking in Table 1.1 in the Student Book connects to conceptual tools taught in other units of the *Scientific Thinking for All: A Toolkit* curriculum. In particular, the lessons about evidence from Unit 1, “Evidence & Iteration in Science,” the consideration of probability from Unit 3, “Scientific Uncertainty & Probabilistic Reasoning,” and the role of alternative causes and effects from Unit 4, “Investigating Evidence for Causation.”

- In Procedure Step 8, students may use any one of the brain teasers to explain how fast thinking could lead to the wrong answer for that question. Student responses should show that they are referring to the characteristics from Table 1.1.

#### Sample Student Response, Procedure Step 8

*For Question 6, fast thinking could lead to taking the total number of weeks (10) and dividing it by 2 to get 5, but that is not the correct answer. Fast thinking can happen because the numbers 5 and 10 are simple eye-catching information and easily come to mind. However, slow thinking shows that the number is doubled every week, so the pattern does not work by just dividing by 2. Using the doubling math pattern is a characteristic of slow thinking.*

- When discussing student examples in Procedure Step 9, review the main differences between the types of cognition. Point out that fast thinking is more automatic and can be done unconsciously. Conversely, slow thinking is a conscious, deliberate process that requires mental effort, allowing you to carefully break down information and check if your thinking is logical. Students should identify that fast thinking tends to be more useful for low-risk, everyday situations when

a quick decision is needed such as catching a ball, choosing a snack, or simple driving decisions. Slow thinking is more useful in higher-risk situations when accuracy is crucial and there is time for deliberation such as solving a complex math problem, making a major financial investment, or evaluating evidence in science.

- In Activity 2, students will be given a scenario related to a disease outbreak. In anticipation of this, the brain-teaser questions on Student Sheet 1.1 are related to human health. Foreshadow Activity 2 by asking students to think about how cognition relates to their own health. Ask, **What are examples of health decisions that might be better to rely on fast thinking for and why?** Sample answers may include low-risk decisions such as choosing a simple product or a situation in which speed is needed, such as deciding to go to the hospital in an emergency. Next ask, **For which types of health decisions would you want to use slow thinking instead and why?** Sample answers may include situations that are more complex, such as how to change your diet to be healthier or decisions that may have more serious consequences, such as choosing whether to take a certain medication or not.

## SYNTHESIS OF IDEAS (20 MIN)

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### 4 Discuss the advantages and disadvantages to the two modes of thinking.

- After completing the activity, give students a chance to compare and contrast the two modes of thinking. Ask, **What are the advantages and disadvantages of fast thinking and slow thinking?** Sample responses may include the ideas that fast thinking is a way to quickly and easily interact with our surroundings through mental shortcuts that allow us to save energy and time. It can be highly valuable for everyday situations or when speed is necessary (e.g., reacting to a threat, performing routine tasks) because it saves time and mental effort. However, slow thinking is less likely to lead to cognitive errors.
- The comparison between the two modes of thinking can be supported by reviewing the responses to Build Understanding item 1, when students complete a Venn diagram about fast thinking and slow thinking. **The Venn diagram will help students acquire vocabulary as they compare and contrast the concepts of fast thinking and slow thinking. You may want to complete the Venn diagram as a class. Have small groups brainstorm what to put in each circle of the Venn diagram and then work as a class to come to a consensus on a complete and correct Venn diagram.** For more information about Venn diagrams, see [Appendix 1: Literacy Strategies](#).

### 5 Have students consider how our mode of thinking can affect decisions.

- Review Build Understanding item 2, which relates to when fast thinking and/or slow thinking is advantageous. There are some obvious answers to these examples, but some that might use either or both modes of thinking such as choosing what to eat or responding to a question. Emphasize that sometimes we use both modes, depending on the situation and our approach to the situation.

- Connections to Everyday Life item 4 foreshadows Activity 2 when students will look at news headlines. In that activity, students are put in an initial position to use fast thinking, so do not yet discuss the types of thinking that are generally used when we scan headlines or social media feeds.

## 6 Introduce slow thinking as the primary conceptual tool of the unit.

- Review the term *cognition* provided in the Introduction in the Student Book. While students learned that cognition can mean many things in various situations, the principle behind slow thinking is that decision-making benefits from taking the time to examine information deliberately. Although the process of slow thinking may look different for different situations, it is an effective conceptual tool for evaluating information. In this unit, the primary way students engage in evaluating information is to use various techniques of slow thinking, making it the primary conceptual tool of the unit.
- The Scientific Toolkit is intended to be a set of conceptual tools that can be applied to everyday life. With each new unit, students will add conceptual tools to their toolkits. Use optional Visual Aid 1.2, “Understanding Conceptual Tools” to support the multiple contexts that are used with the word *tool*, which is defined as an implement used to carry out a particular function. The word is commonly used to refer to construction tools such as hammers, levels, and tape measures. In a science classroom, examples of scientific tools include beakers, graduated cylinders, and microscopes. In this unit, there is a digital analysis tool that is used to support decision-making. There are also many tools from the last category presented on the visual aid—Conceptual Tools—that are used to analyze group decisions. In this course, students consider conceptual tools, such as weaving facts and values, as a way of exploring the application of science to everyday life.
- As students build understanding about the importance of slow thinking in evaluating information, they will build a conceptual tool about this idea in their minds and develop skills to utilize it at various points in the unit. You may wish to use optional Student Sheet 1.3, “Unit Concepts and Skills,” to help students organize their learning. This course organizer is designed to help students reflect on their understanding of the conceptual tool, consider how they have used it to analyze problems throughout the unit, and how it may influence their decisions about unit topics.
- While a sample response for optional Student Sheet 1.3, is provided at the end of this activity, students will not be able to complete it at this time. The ideas in the sample response will be built over the course of the unit. At the end of this activity, students can add information about the role of fast thinking and slow thinking in cognition.

## 7 Review the key concepts of the activity related to cognition.

- Support students, particularly emerging multilingual learners, in sensemaking and language acquisition by reviewing the terms presented in the activity and supporting the construction of a word wall. You may want to model a sample response as a class to help scaffold student understanding. For this activity, record the terms *cognition*, *fast thinking*, and *slow thinking*. Provide additional examples for each term as needed. For more information on a Word Wall, see [Appendix 1: Literacy Strategies](#).

- As an additional support for the development of new vocabulary and concepts during the activity, consider using a Frayer Model with students as shown on optional Student Sheet 1.2, “Frayer Model.” Use one sheet for each of the concepts of fast thinking and slow thinking. The model(s) can be introduced in the beginning of the activity, filled out as the activity unfolds, and reviewed at the end of the activity. For more information about the Frayer Model, see [Appendix 1: Literacy Strategies](#).
- Finish the activity by revisiting the Guiding Question, *What are two different modes of thinking?* Use the responses to this question to formatively assess students’ understanding of the key concepts and process skills related to fast thinking and slow thinking. Students should be able to recognize the advantages and disadvantages of both modes of cognition and why this makes them more useful or less useful in different situations.

## EXTENSION (20 MIN)

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### 8 Use the Extension as an opportunity for advanced learning.

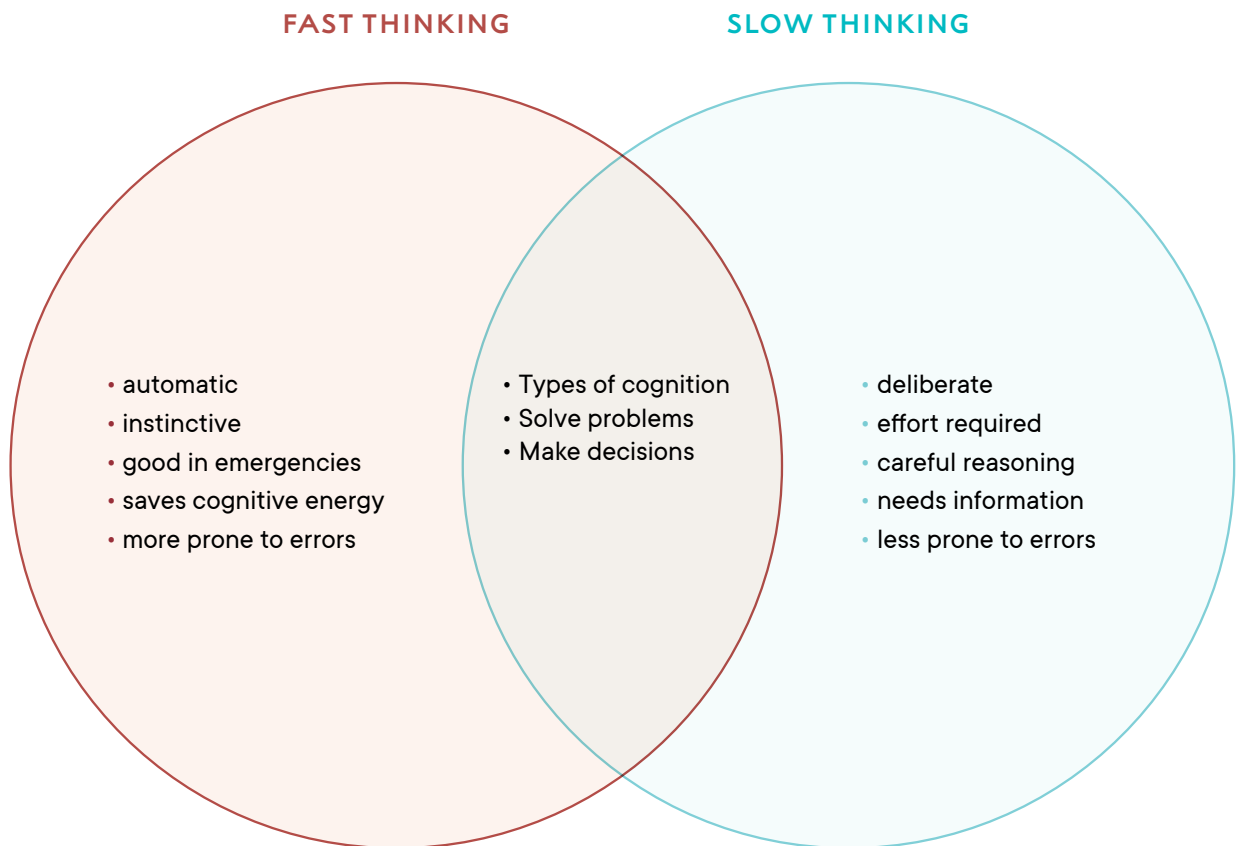
Students can have a friend or family member answer the brain-teaser questions (on Student Sheet 1.1) as a way of seeing how different people approach problem-solving. Students can make note of any differences in techniques that their friends or family use. Again, emphasize that the brain teasers are not about right or wrong answers; rather, they are about the mode of cognition used to answer them.

# SAMPLE STUDENT RESPONSES

## BUILD UNDERSTANDING

The Build Understanding and Connections to Everyday Life items are intended to guide student understanding. You may decide to assign some or all of them, depending on the needs of your students. However, some of the items are recommended in particular activities for use as assessments or to review key concepts.

- ① Make a Venn diagram like the one below. Fill in the areas in the circles to compare and contrast fast thinking and slow thinking. Consider the features of each mode of thinking, the advantages and disadvantages of each, and situations in which each is useful.



② Which would be more useful to apply in the following situations: fast thinking and/or slow thinking? Explain your reasoning.

**a Choosing what to eat for breakfast.**

*Either fast thinking if it is routine and you eat the same thing most days, or slow thinking if you are considering all the options because it's an everyday decision.*

**b Responding to a fire alarm that goes off in your classroom.**

*Fast thinking so you can respond quickly and get out of danger.*

**c Changing your diet to improve your health.**

*Slow thinking because it has long-term consequences to my health, and I need time to research a plan that might work for me.*

**d Communicating to the coach what has happened when a teammate gets hurt.**

*Fast thinking so your teammate gets help quickly.*

**e Deciding who to vote for in the class election.**

*Slow thinking so you can investigate the candidates.*

**f Providing directions to a location that you are very familiar with.**

*Fast thinking because you have gone there so many times.*

**g Responding to a common question such as, *What's your favorite movie?***

*Either fast thinking if you already know, or slow thinking if you need to think of all the movies you have watched.*

③ Imagine that an emergency responder comes upon a scene where someone has been badly hurt. Think about the knowledge, skills, and experience the emergency responder has. How would the responder's fast thinking be different from an ordinary person's fast thinking?

*A first responder has a lot more expertise to draw on when responding to an emergency and using fast thinking, such as basic medical knowledge and relevant first-aid skills. An ordinary person does not have this body of knowledge to draw on when responding with fast thinking.*

## CONNECTIONS TO EVERYDAY LIFE

- ④ You are meeting friends downtown. The fastest way for you to get there is on your bike, but your bike lock is broken. Your only other option is to walk, which will take much longer. You have recently seen a news headline that states: *The City Experienced a 300% Increase in Bicycle Thefts Last Month!*

a What would you be most likely to do? Explain your reasoning.

*I would walk. A 300% increase is a huge increase in thefts, and I'd be worried about leaving my bike anywhere.*

b You later find out that the average number of stolen bikes in the city was 1 per month, but there were 4 bikes stolen in the previous month—a 300% increase. How would this information change, or not change, your behavior?

*Knowing that the actual number of bicycle thefts was very low would make me less worried about leaving my bike unlocked. I would ride my bike downtown.*

c Was your decision affected by fast thinking and/or slow thinking? Explain.

*My first decision was based on fast thinking because I did not consider other ways to interpret the data.*

- ⑤ Describe a recent example when you used fast thinking but would have been better served by using slow thinking. How could slow thinking have changed the outcome?

Responses will vary.

*My friend recently came up to me and asked how I was doing, and I automatically responded, "Fine," and left. I was actually really upset about something. If I had slowed down a bit and worked through why she asked me (because she cares) and how she could help me (listen to my problem), then I would have been more likely to tell her what was bothering me. That could have made us both feel better.*

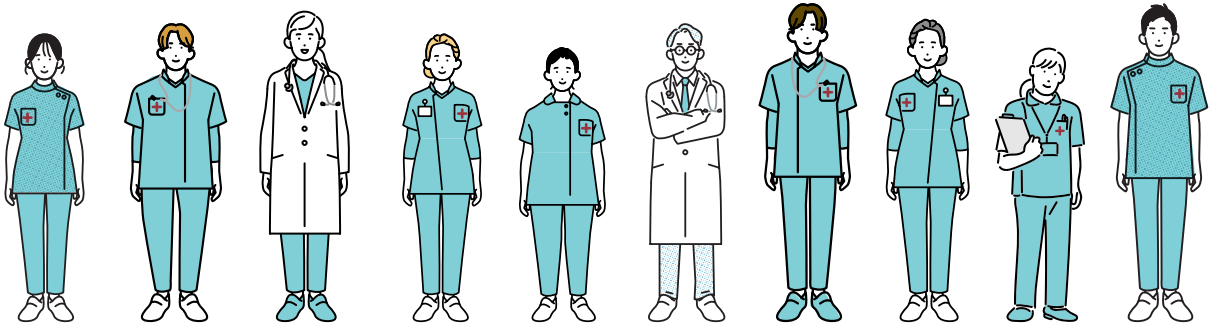
**Circle the one best answer.**

- 1** I live in your chest, and I work like a drum. I keep you moving, from your head to your thumb. What am I?
  - a. LUNG
  - b. HEART
  - c. BRAIN
  - d. STOMACH
  
- 2** Which job is safer: being an electrician or a delivery driver?
  - a. ELECTRICIAN
  - b. DELIVERY DRIVER
  
- 3** If it takes 5 lab technicians 5 minutes to prepare 5 bottles of medicine, how long would it take 100 lab technicians to prepare 100 bottles of medicine?
  - a. 5 MINUTES
  - b. 25 MINUTES
  - c. 100 MINUTES
  - d. 500 MINUTES
  
- 4** Arlo coughed on Bea, and Bea coughed on Kim. Arlo is sick, and Kim is not, but they don't know whether Bea is sick or not. Did a sick person cough on a healthy person?
  - a. YES
  - b. NO
  - c. NOT ENOUGH INFORMATION

**5 Jamie works at a health clinic. Jamie has:**

- a passion for diagnosing illness.
- a lot of confidence.
- likes to give orders.

The following sketch shows Jamie and their coworkers lined up for a photo. Is Jamie more likely to be a doctor or a nurse?

**a. DOCTOR****b. NURSE****6 A new illness is spreading through a town. Every week, the number of people with the illness doubles. The first week there was just 1 case, the second week it became 2, the third week it was 4, and so on. After 10 weeks, everyone has the illness. In what week did half of the town have the illness?**

- a. WEEK 5**
- b. WEEK 7**
- c. WEEK 9**
- d. NOT ENOUGH INFORMATION**

**7 Children with larger shoe sizes tend to have higher reading comprehension scores. What statement is the best interpretation of this?**

- a. Larger feet lead to better circulation, which boosts reading ability.**
- b. Children who read well feel more confident and therefore select larger shoes.**
- c. The larger the shoe size, the more likely the child is older, and older children generally have more reading experience.**

Circle the one best answer.

- 1 I live in your chest, and I work like a drum. I keep you moving, from your head to your thumb. What am I?

a. LUNG

b. HEART

c. BRAIN

d. STOMACH

- 2 Which job is safer: being an electrician or a delivery driver?

a. ELECTRICIAN

b. DELIVERY DRIVER

REASONING: There are about 3 times more deaths and injuries for drivers. But it's tempting to answer "electricians," because it's easy to imagine an electrician getting electrocuted. We rarely think about delivery drivers getting in accidents.

- 3 If it takes 5 lab technicians 5 minutes to prepare 5 bottles of medicine, how long would it take 100 lab technicians to prepare 100 bottles of medicine?

a. 5 MINUTES

b. 25 MINUTES

c. 100 MINUTES

d. 500 MINUTES

REASONING: The tempting answer is "100 minutes," through pattern matching. The correct answer is "5 minutes," since it basically takes each technician 5 minutes to prepare one bottle of medicine.

- 4 Arlo coughed on Bea, and Bea coughed on Kim. Arlo is sick, and Kim is not, but they don't know whether Bea is sick or not. Did a sick person cough on a healthy person?

a. YES

b. NO

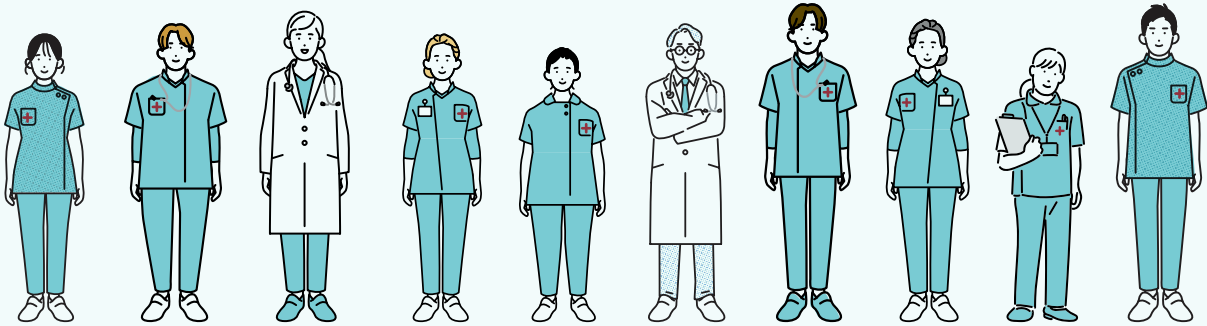
c. NOT ENOUGH  
INFORMATION

REASONING: The tempting answer is "not enough information," because you don't know if Bea is healthy or not. But the real answer is "yes," because Bea is either sick, in which case sick Bea coughed on healthy Kim, or Bea is healthy, in which case sick Arlo coughed on healthy Bea.

**5 Jamie works at a health clinic. Jamie has:**

- a passion for diagnosing illness.
- a lot of confidence.
- likes to give orders.

The following sketch shows Jamie and their coworkers lined up for a photo. Is Jamie more likely to be a doctor or a nurse?



a. DOCTOR

b. NURSE

**REASONING:** Jamie is more likely to be one of the 8 nurses rather than one of the 2 doctors. Fast thinking may lead students to think that Jamie is a doctor because that description sounds more typical of a doctor than a nurse. But slow thinking reveals that Jamie is more likely to be a nurse because there are far more nurses than doctors shown.

**6 A new illness is spreading through a town. Every week, the number of people with the illness doubles. The first week there was just 1 case, the second week it became 2, the third week it was 4, and so on. After 10 weeks, everyone has the illness. In what week did half of the town have the illness?**

a. WEEK 5

b. WEEK 7

c. WEEK 9

d. NOT ENOUGH INFORMATION

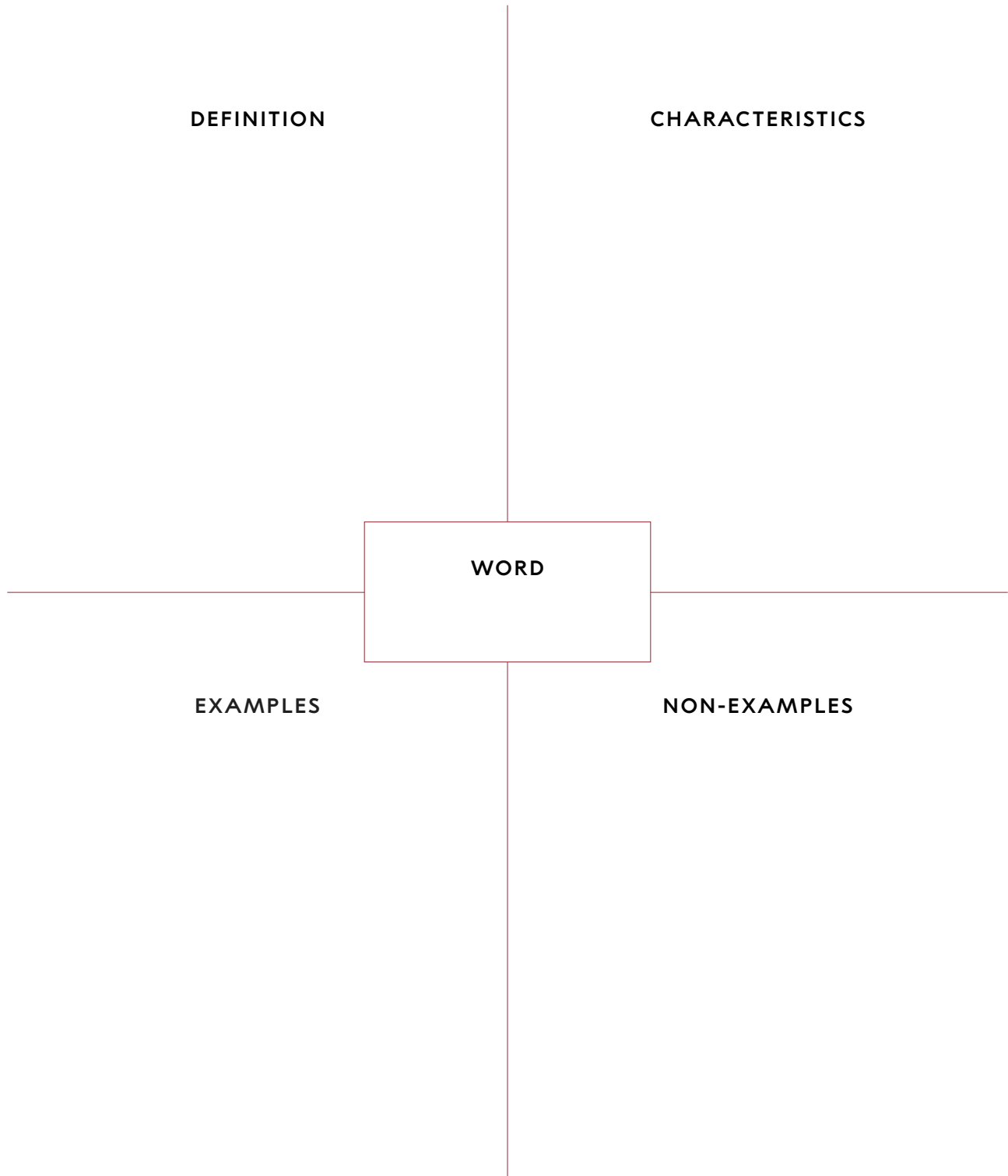
**REASONING:** Tempting fast-thinking answer: "week 5", because it's half of 10. Correct slow-thinking answer: "week 9".

**7 Children with larger shoe sizes tend to have higher reading comprehension scores. What statement is the best interpretation of this?**

a. Larger feet lead to better circulation, which boosts reading ability.

b. Children who read well feel more confident and therefore select larger shoes.

c. The larger the shoe size, the more likely the child is older, and older children generally have more reading experience.



**DEFINITION**

*quick, automatic thinking that uses shortcuts to reach conclusions*

**CHARACTERISTICS**

*Relies on:*

- *simple information*
- *the information that first catches one's attention*
- *information that comes easily to mind*

**WORD**

*fast thinking*

**EXAMPLES**

- *Getting ready for school with the same morning routine.*
- *Buying or doing something impulsively.*
- *Judging someone on their appearance.*
- *Skimming a headline.*

**NON-EXAMPLES**

- *Comparing the price and quality of products.*
- *Using a map to estimate travel times.*
- *Collecting and connecting clues to solve a mystery.*

**DEFINITION**

*careful, reflective thinking that uses reasoning to reach conclusions*

**CHARACTERISTICS**

*Considers:*

- *complex information*
- *math or reasoning steps*
- *the likelihood of an event*
- *alternative possible causes*

**WORD**

*slow thinking*

**EXAMPLES**

- *Questioning whether a viral video is actually fake.*
- *Figuring out how to beat the next level of your video game.*
- *Drafting an essay outline.*
- *Solving a complicated math problem.*

**NON-EXAMPLES**

- *Scrolling on your phone without remembering much of what you see.*
- *Entering a passcode on your phone without thinking.*
- *Singing along to a song while doing something else at the same time.*
- *Having a gut feeling or intuition.*

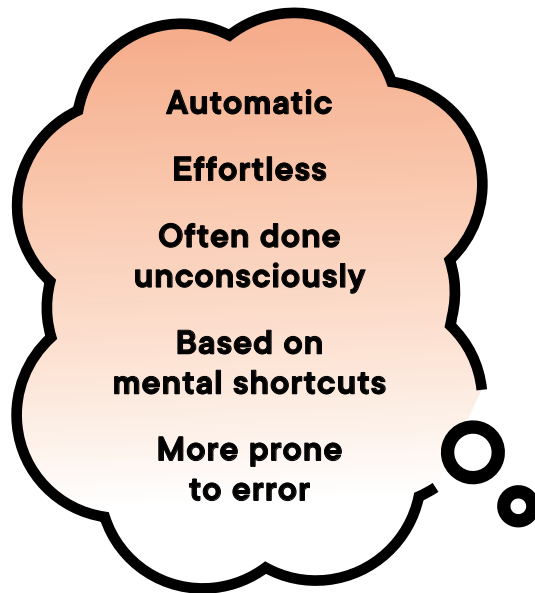
| UNDERSTAND |             | ANALYZE         |
|------------|-------------|-----------------|
| CONCEPT    | DESCRIPTION | UNIT EXAMPLE(S) |
|            |             |                 |
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WHAT DECISION(S) WERE MADE OR ACTION(S) TAKEN?

| UNDERSTAND                   |                                                                                                                                                                                    | ANALYZE                                                                                                                                                                                                                                                                               |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CONCEPT                      | DESCRIPTION                                                                                                                                                                        | UNIT EXAMPLE(S)                                                                                                                                                                                                                                                                       |
| <b>Fast Thinking</b>         | Quick, automatic thinking that uses shortcuts to reach conclusions.<br>Useful for routine situations but is more likely to lead to errors.                                         | Brain teasers, skimming Southsand City news headlines, cognitive shortcuts, PSAs                                                                                                                                                                                                      |
| <b>Slow Thinking</b>         | Careful, reflective thinking that uses reasoning to reach conclusions.<br>Useful for complicated or high-stakes situations and less likely to lead to errors.                      | Analyzing the brain teasers, evaluating Southsand news article, comparing evidence in the game, peer review, clinical trials, pellagra investigation, mRNA vaccine, figuring out the pathogen, analyzing data for the recommendations, making PSAs                                    |
| <b>Metacognition</b>         | Thinking about my own thinking.                                                                                                                                                    | Reflecting on how I respond to media stories, thinking about my own use of social media, slowing down thinking, confirmation bias activity                                                                                                                                            |
| <b>Cognitive Shortcuts</b>   | Patterns of fast thinking that can lead to errors.                                                                                                                                 | Halo effect, availability shortcut, representativeness shortcut, anchoring shortcut, social media posts about bird flu                                                                                                                                                                |
| <b>Confirmation Bias</b>     | When you look for information based on your pre-existing beliefs (biased selection).<br>When you interpret information based on your pre-existing beliefs (biased interpretation). | Choosing evidence based on if social media is harmful to teens, stories and comments about Southsand fever from residents, cherry-picking, local poultry-farmer question                                                                                                              |
| <b>Actively Open Mindset</b> | Evaluating source credibility, seeking evidence, and considering alternative ideas.                                                                                                | Considering the opposite claim about social media being harmful or not, brainstorming ways to reduce cognitive biases for Southsand City residents, staying open to alternative hypotheses for the game, scientific inquiries of pellagra and mRNA vaccine, figuring out the pathogen |
| <b>Cognitive Bias</b>        | When you make an error in thinking unconsciously and in a predictable way.                                                                                                         | Confirmation bias, conflict of interest, conformity bias, emotion bias, analyzing stories and comments about Southsand fever from residents, PSAs, scientific inquiry of pellagra and mRNA vaccine                                                                                    |

## WHAT DECISION(S) WERE MADE OR ACTION(S) TAKEN?

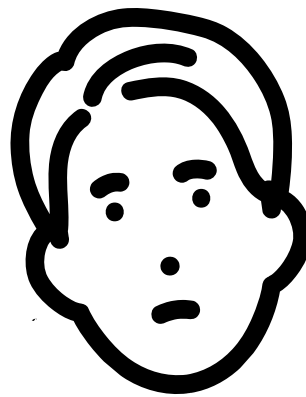
Choosing a recommendation for how the fictional city could reduce the risk of the Southsand fever, making a PSA for a Southsand fever recommendation.

**FAST THINKING****Examples of Fast Thinking:**

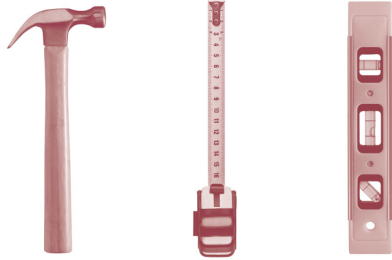
Recognizing a face  
Judging someone on their appearance  
Skimming a headline

**SLOW THINKING****Examples of Slow Thinking:**

Drafting an essay outline  
Solving a complicated math problem  
Learning a new dance



## CONSTRUCTION TOOLS



## SCIENTIFIC TOOLS



## SCIENTIFIC TOOLS + TECHNOLOGY



## CONCEPTUAL TOOLS

