

## English 9

### Unit 1 Test - Part 6 (Oct. 11, 2023)

#### Study Guide

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This part of the test is closed note and closed book. The study guide resources (with all the answers) are provided (attached). This is Part 6 of a 6-part test. This part of the test is the highest-level part of the test. Focus on the bolded questions first, as they are the most helpful to know for later work this term.

For all terms and questions, make sure that your answer is based on the handouts (attached). Use the glossary provided in the handout (attached). We went over this in class today.

Vocabulary (matching, then using key terms in real-life examples):

- **Component**
- Description-level analysis
- **Develop**
- Element
- Explanation-level analysis
- **Novice**
- Outline (noun)
- Outline (verb)
- Paragraph
- Paraphrase (noun)
- Paraphrase (verb)
- **Process**
- **Revise**
- Scholar
- **System**
- Systems-thinking
- **Theory**
- Transform

Short answers (3-5 sentences per question):

- **How does writing make thinking visible?**
- **List and define each of the Five Fs.**
- **List the Levels of Analysis.**
- Define “focusing question” and explain how this helps you come up with a good thesis statement. (What are the key words to have in a focusing question? What are the key words to have in a thesis statement?)

## English 9

### Unit 1 Test - Part 5 (Oct. 10 and 11, 2023)

#### Study Guide

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Write a 5-paragraph paper on how to write an Expository Essay. Use lined paper, double space, and use the correct format (as covered in class). Spelling is not marked.

1. Write an outline (use separate sheet of paper).
  - a. The paper must include quotes from each of the two articles (see step 2).
2. Review the two articles: “How to Write a Research Paper” and “Systems Thinking”.  
Take notes (1 page of notes in total).
3. Write the paper, using this outline framework:
  - a. Introduction
    - A. Topic: Expository paper (how to write)
    - B. Theme: make thinking visible **or** systems-thinking
    - C. Road map:
      1. Key idea #1: \_\_\_\_\_
      2. Key idea #2: \_\_\_\_\_
      3. Key idea #3: \_\_\_\_\_
  - b. Main idea #1
    - A. Filler 1: \_\_\_\_\_
    - B. Filler 2: \_\_\_\_\_
    - C. Filler 3: \_\_\_\_\_

c. Main idea #2

A. Filler 1: \_\_\_\_\_

B. Filler 2: \_\_\_\_\_

C. Filler 3: \_\_\_\_\_

d. Main idea #3

A. Filler 1: \_\_\_\_\_

B. Filler 2: \_\_\_\_\_

C. Filler 3: \_\_\_\_\_

e. Conclusion

A. Restate the roadmap (looking back)

B. Restate the thesis

C. Connect/reflect (if you want to, it makes sense to do this)



thing, since there is little point in writing garbage with little value to you or the world. It's also a good thing because the writing process simply requires that you work in steps. Following these steps in order is not that much harder than just throwing out uninformed and worthless ideas. The fact is that writing devoid of meaning and significance is not only a waste of your time and the reader's time, but it's also really hard to do (in any way that makes sense). How can you write when you don't know what you want to say? Why even bother?

"Writing is thinking. To write well is to think clearly. That's why it's so hard" (p. 56).

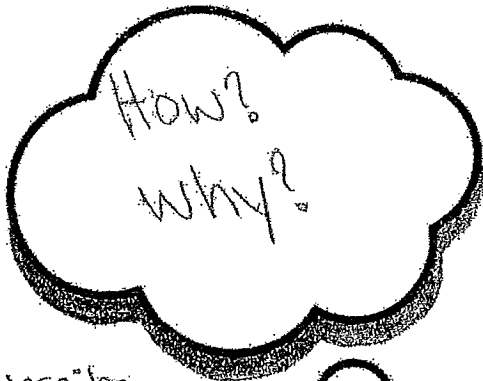
Quot

McCullough is making the point that what's hard about writing is thinking, not writing itself. This means that to improve your writing you must first improve your thinking. Lucky for you, one of the best ways to think better is to write more. Writing (and its cousins speaking, listening, reading, representing, storytelling, and modelling) are the keys to thinking well.

This means that the best part of writing is that it helps you become a better thinker - just by writing. In other words, better thinking is an automatic benefit of writing. Like magic, your thinking improves when you sit down and write. And that's because writing is thinking made visible.

When you write, you are putting your thoughts on paper. And once you can see your thoughts you can improve how you think.

The simple act of writing forces you to focus on one thought at a time, makes you use language to think, and requires enough clarity for your ideas to make sense. All of this improves your thinking and makes you more intelligent. According to psychologist Lev Vygotsky, "Writing is by its very nature a linear process. You put one thought in



Describe  
Quote  
Explain

## Writing Is Thinking Made Visible

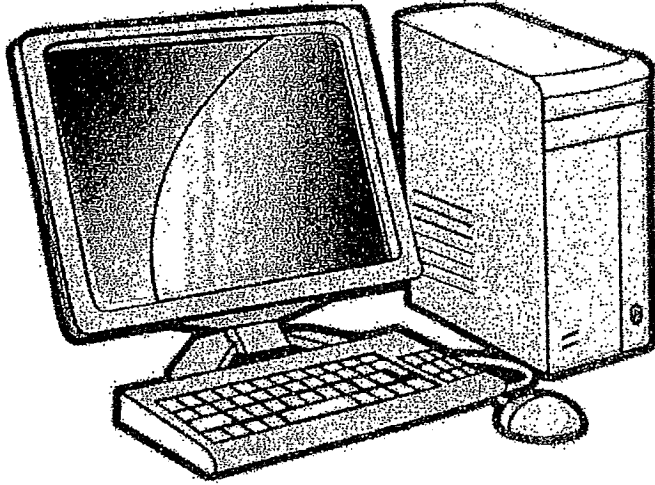
Section heading

Most of the power that comes from writing is actually the power of thinking well. When you write you put your thoughts on paper. You make your thoughts visible.

Note

According to author David McCullough;

Describe



If you ask most people why writing is important, they are likely to say that its value is in how it helps you **communicate**. True, writing produces books, speeches, articles, journals, movies, viral videos, and memos. These are all communication tools. But that's not the real value of writing. Far more valuable is how writing helps you think better. **In short: Writing is a process that leads to better thinking.**

The process of writing is essentially just doing a few simple things over and over. The difficulty is not in each step - because every step in the process is easy to do.

Instead, what makes writing difficult is that you can't skip any of the steps. In this way, writing is like building a house. You start with the blueprint, then you get the materials, then you build each component (or part) of the house, and finally you assemble the house and put all of the pieces together. As with other systems, writing combines elements (essential components) so that they can work together to do more than they would on their own. The key to writing well is knowing the elements and combining these elements in a step-by-step process.

You can't write well without working through the processes of writing, researching, and thinking. And that's a good

# How to Write a Research Paper

By Juno Pappas

## Introduction

For lots of students writing is either a pain or a panic. It's a pain if they find writing boring, uninteresting, or not important. A chore and a bore. And writing is a panic if the student finds it hard, confusing, and a direct pathway to poor marks. But the reality is: Writing is not just powerful and useful, it's also pretty simple to do. The key to writing well is to understand its value and to know how to do it in the simplest and most effective way.

title

Section header

for lots

thesis

bolded text

key idea excited



important

author

front of another. All of this (visibility, focus, clarity, and order) combine to make writing a powerful and useful tool at improving your thinking.

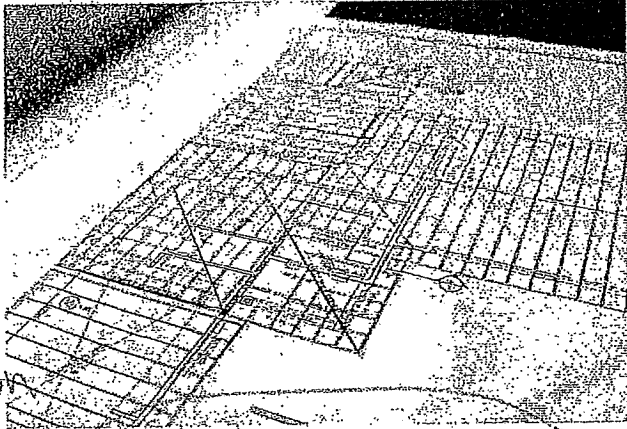
Thinking is hard work. Thinking requires that you know, understand, and can explain the reality of things. Knowing is describing. It is seeing. And it is labeling. To know something is to see and recognize the truth of it. You must see reality. You must be able to describe it. And you must be able to label what you see, so you will notice the details of things and can then discuss how reality works.

To explain something you first need to understand it. You can't understand something that you don't even see. Knowing how to label something requires seeing it. Knowing each of the components and all of the interactions lets you dig deeply and truly understand something. Once you can do this, then writing about it (explaining what you see) is pretty easy. You just describe the details, put out the connections, and share your ideas and understandings.

Part of describing is asking **description-level** questions such as: What? Where? When? Who? How many? Another part of describing is **systems-thinking**. Systems-thinking is viewing things as

systems that are composed of different parts that work together to perform a certain function. This way of thinking does more than break things down to their various parts and functions. It also requires that you look for (and set) the system's boundary and the inputs/outputs that cross that boundary. Systems-thinking looks at something, breaks it down to its parts and sees how those parts interact or connect. Describing how this works is the first step in being a better thinker.

Good thinking goes beyond describing, taking you to the **explanation-level**. This requires asking and answering questions that start with "how" and "why". How do things work? Why are things the way that they are? Why does this matter? Explaining looks for **meaning** and **significance**, or importance. These questions require **theories**, which are explanations based on descriptions of reality. In science, theories answer how and why and are based on facts, data, and logic. Theories explain reality. In other **disciplines** (areas of study), such as art or literature, theories can be based on opinions as well as on facts.



action  
writing

## Thinking Is a Process, and So Too Is Writing

According to author Octavia Butler, "You don't start out writing good stuff. You start out writing crap and thinking it's good stuff, and then gradually you get better at it" (p. 78). She continues by saying that this is "why I say one of the most valuable traits is persistence" (p. 78). This shows how writing and thinking are both processes. You start with an initial idea. You write it down. At first, it looks good. But then you realize a deeper or more accurate thought. So you rewrite what you wrote. And repeat. The process for thinking and writing can be summed up as follows: Research. Write. Revise. Repeat.

Research is studying something to make new discoveries about it or to reach new understandings of it. You research through reading, observing, investigating, and questioning. The writing process starts with researching. Researching is how you

learn things that you can then write about. Scientific research is focused on finding facts and recording data. Scientific research also involves looking at past and current theories and applying logical thinking to understand the facts and to explain what they mean. Scientific research includes applying **critical thinking** and **skepticism** as well. It should also be noted that not all research is scientific. Some research involves just thinking, just making comparisons, and even just having a well-developed opinion on something.

**Step 1:**

Start with a

Focusing Question

- Sub-section  
header

Writing and thinking are processes that are closely linked to the process of researching. Almost all research involves writing and thinking. And writing and thinking are often involved in some form of research, especially if you include informal research. The process of researching starts with asking a question. At the high school and college level, research questions should always ask either a how or a why question. By asking either how or why, you are certain to include some sort of theory or analysis in your answer. Otherwise, you risk staying at the describing level - which isn't really



research (at least not research past the elementary school level),

**Step 2:** *Section header*

Learn from Other Texts  
and  
Take Notes While You Read Them

After you have a good question, the next step in the research process is to learn as much from other people who study the same question that you are researching. You can do this by reading books, reading articles, reading encyclopedias, reading news sites, interviewing people, watching videos, and by reading textbooks about the subject. As you read or listen to all of these sources, be sure to take detailed notes. Your notes should focus on facts, dates, data, and vocabulary.

*quotes* Rather than **paraphrase** or copy passages from your sources, notes should just include the key information or short quotes (the ones that really stand out). If you copy anything word-for-word (including a short quote) be certain to put in quotes, like this: "This is how to put it in quotes." You must also include information on the source of what you copy. This should include the title of the book or article, a website's URL, the date of publication, the page number, and the author. (If you don't know something, then write down "unknown" so

you remember that you didn't know that.) Be very careful to say, in your notes, who your source is (who wrote it first). Otherwise, you may accidentally **plagiarize** when using your notes.

As you read, be sure to take notes on more than what you are reading. About half of your notes should be what *you* think: Your ideas. Your questions. Your feelings. Your connections. Write as many of your own reflections and thoughts as possible, rather than focusing just on what the book, article, or video says you should also focus on your thoughts and ideas. By doing this, you will have your own thoughts already organized for when you are ready for the next step.

**Step 3:** *Section header*  
Put the Texts Aside,  
Read Your Notes,  
Think About Them, and  
Then Write to Think.

Once you have read lots of other sources and taken detailed notes from each source, the next step is to focus on *pure thinking*. There are several ways to do this and all involve writing to think in some way or another. The key is to *just think* about the topic you are studying. Start by reading your notes. Add to the notes as you read them, especially if you find any missing or confusing information. After reading your

notes, pick up a pencil and a blank sheet of paper and just write. Try to explain all of the interesting and important ideas you remember reading about. Then write what you think about these ideas. Come up with your ideas.

The important thing to do at this stage in the process is to put aside the books or articles that you read. You want to put these aside so you can focus on your notes instead. This "setting aside" of the text acts as a brain-filter, forcing you to think about what you read rather than just repeat what someone else said. The key: Write to learn. Write notes to remember the key information (facts, ideas, dates, concepts, vocabulary). Then use the notes (not the text that you read) as your starting point for your writing. Using the notes, start writing your own understanding of how the facts and other information fit together.

**Step 4:** Start Planning Your Paper and Write an Outline

The first steps of the process were to ask a question, read other sources in search of answers, and to take notes along the way. Part of these steps included writing early reflections and summaries, in your own words (not copied and not paraphrased), on the ideas and facts that you read about.

Once you have done all of this, you are finally ready to start planning your paper. You are ready once you have a question that asks how or why, have read or researched from a number of credible sources, have notes from each of these sources, and have used those notes to write your early thoughts on the topic.

For the planning step, the first thing you will do is look back at the original question. Is this the right question? Did the question change based on the research you did? Could you find information related to that question, or does another question lead to better information? Are you still interested in the original question? Was the original question focused enough to lead to a clear and specific thesis? Based on your answers to all of the above questions, either keep or change your question. Whatever you do, make certain that your question asks how or why, is specific and narrow, leads to interesting answers, and is one that you can answer in the time you have now (to write this particular question).

You are now ready to focus on the answer to your question. Pull out your paper once again and, based on all the notes and information you have now, write your answer to the question. Explain why you think the

question is interesting. Explain your answer to the question. Provide all of the evidence, examples, stories, facts, data, and logic that supports your answer. This can be written in either draft form - as a rough draft paper - or in informal outline form.

The last part of the planning step is to write a formal outline of your paper. This is your blueprint. An outline is very helpful because it forces you to break your argument (in support of the evidence that backs up your thesis) into **sections**, **subsections**, and **paragraphs**. This not only makes your paper more organized but also helps you build your argument in a way that makes sense. One supporting idea can lead to another one, in an order that helps the reader really understand the point that you are making. Your outline will establish a plan for the structure, or form, of your paper. The form itself helps the reader make sense of the meaning you are trying to communicate.

**Step 5:**  
Use the Outline to Write Your First Draft

Section heading

For most **novice**, or inexperienced, writers Step 5 is what they think of when they hear "writing". To them, writing is just sitting down and typing out a complete paper. Experienced writers know that the

first four steps are essential to do first, before you are ready to start drafting a full version of the paper you plan to write. Novice writers struggle with what to write because they didn't spend the time to **develop** a focusing question, they don't know what to focus on. They also didn't read or research about their topic and thesis. So they don't know what to write about. Essentially, they are not ready to start thinking about the question. So they stall out.

But experienced writers know that the first four steps, which take time to do, all count as part of the writing process. They know that reading and note taking are writing. They know that revising their notes, putting their own thoughts into what they read, is writing. And they know that thinking about, by writing about, their focusing question and key ideas is also writing. Finally, they know that an outline saves time and improves quality by helping you focus and have structure. Most importantly, experienced writers know that there are no shortcuts to being prepared. You have to know what you will write about in order to write about it.

Basically, Step 5 is simple: Look at your outline and follow it. Write according to

the structure and points that the outline says to write according to. Put in the details, the filler, that you have listed on the outline. Do this quickly and efficiently. Just the facts. Nothing fancy. Just get the ideas out there. At this stage, you can ignore all of sorts of things, such as flow, **voice**, feeling, style, and depth. The first draft is a like a skeleton - just bones. Later, you can <sup>fresh it out</sup> and add all the details that will build a complete paper. In a nutshell, your first draft should simply state the point you want to make. That's it. (A key tip: Don't think too much at this stage: Just do it!)

sub sections heading  
Section heading  
**Step 6:**  
**Take a Break and Then Revise**

Once you have your first draft done it's usually a good idea to take a break. Set your paper down and let it sit for a while. You can either take a full break, which means you stop thinking about the thesis and topic of your paper, or you can take a half break. A half break means you stop drafting but keep thinking and researching. Some writers will go back and reread the other sources. (This is a really good idea. Re-reading after writing makes way more sense and can help you really dig down to deep understanding. If you aim for an A you'll want to include this in your process.

Reading at this stage produces "pay dirt" that's filled with nuggets of real understanding.)

Your break is over. Now it is time for the hardest part of the process: **Revision**, which is not editing (defined later). Revision is much more than editing and is focused on improving two things: Your thinking (the power of your ideas) and your clarity (the power of making sense to your reader). In revision, you read your first draft and then you rip it apart. You delete stuff that is unclear, confusing, or not needed. You add stuff that helps improve clarity or that makes your point stronger. You add depth and details to your first draft. You change the structure, or form, to help guide your reader to the point you are trying to prove in your paper.

Part of revision is to add flow and feeling to your paper by taking care of transitions, voice, and style. Add your personality and your approach to building and supporting an argument. Add connections to your own life and point of view. Add stories that help the reader understand your thesis. Pay attention not just to the point, not just the evidence, but also to how it all sticks together and how the writing flows and feels.

Important!

## Section heading

### Step 7:

#### Give Up and Stick to the Deadline

*Quote!* A dark and painful truth to writing is that you are never finished. No paper is ever 100% good enough, especially not for the writer who cares about making an important point. You simply need to give up at some point and wrap it up. Thankfully, most papers have deadlines. A deadline forces you to stop revising and to just give up on making more improvements.

### Step 8:

#### Edit the Darn Paper - Wrap Things Up

The final step is pretty simple. Once you give up on perfection, now you just need to wrap things up by editing for spelling, grammar, punctuation, clarity, and structure (or form). This is when you go over the final draft and just fix (not add). You can remove unclear or off-topic sections, but it's generally a bad idea to add anything at this point. Editing is about taking what you have written already and polishing it up. It's a good idea to get help with this process. Have a partner read your paper and point out misspellings, unclear or awkward sentences or sections, grammar mistakes, and missing punctuation. And then: You are done.

Of course, there is a final final step: *Quote!*

Publishing. Power comes from sharing your thoughts made visible with other researchers. This is how you influence what other people think and how you shape how we can all understand what you have discovered through your writing process. Clear and effective writing is powerful because it helps us see reality as it is (or as it should be). By sharing your work, you help us all become more intelligent and more capable. So, thanks for publishing your work! You are a **scholar** who makes a difference and the world thanks you!

While publishing is an important part of scholarship, most research writing is not actually published. That is because most research writing is simply for the author to think and explore ideas. We all learn better by writing. This is how we can organize ideas and reflect on our own beliefs, insights, and ways of understanding and explaining reality.

#### Conclusion:

*Sub section header*

## Why the Writing Process Is Important

Writing is a powerful tool for helping people understand each other, the world as

# glossary

it is, and the possible, as the world can be.

step The writing process makes thinking visible, so that you and others can "see" the power of your thoughts. By working through the process you transform yourself through writing, becoming more capable at understanding things. To gain this power, and to be in control of it, you need to slow things down and pay attention to what you are doing. The writing process does both: it slows things down so you can see the ideas that you want to understand. The process focuses you, giving you control over your own thinking and control over how other people's thinking will influence you and your thinking.

Quote!

If you want to have power and control in your life, you should focus on being a strong thinker. Writing, researching, revising, reflecting, connecting, and knowing are essential parts of the process to becoming a strong thinker. Just like with being a strong athlete, to be a strong thinker, or scholar, you must practice, practice, practice. The act of reading, researching, and writing is the practice you need to be powerful in your own thinking.



There is a 99% chance that the final test will include reading this article and explaining the main points for the test

**communicate** (*verb*) to share or exchange information, news, or ideas

**component** (*noun*) a part or element of a larger whole

**critical thinking** (*compound noun*) the process of objective analysis of an issue in order to form a judgment

**description-level** (*noun*) the level of analysis that is focused on building knowledge by paying attention to, measuring, observing, and labeling reality

**develop** (*verb*) to grow or cause to grow and become more mature, advanced, or elaborate or to plan something and to make it happen by working through a process

**discipline** (*noun*) a subject or topic of study or scholarship, an area of knowledge such as biology, psychology, chemistry, literary study, or mathematics; or to have power or control over your own thinking and behaviour (*self-discipline*)

**effective** (*adjective*) successful in producing a desired or intended result

**element** (*noun*) a building block of something, or a part or aspect of something abstract, especially one that is essential or characteristic (meaning you build things with essential elements, you need the elements in order to build them)

**essential** (*adjective*) absolutely necessary; extremely important; a specific kind of ingredient that you need in order for something to exist or happen

**explanation-level** (*noun*) the level of analysis that is focused on building knowledge by developing theories that explain descriptions of things, that explain how or why things are the way that they are

**meaning** (*noun*) what is meant by a word, text, concept, or action; the purpose or function of something; the reason why something is important

**novice** (*noun*) someone who is just starting to learn about something or how to do something; novices usually learn from experienced mentors; you start as a novice and with experience, teaching, feedback, and practice you will become an expert.

**outline** (*noun*) a general description or plan giving the essential features of something but not the detail; or a formal structure for planning a paper that uses Roman numbers, letters, and numbers to structure and plan out a paper; or a system of notes when reading a text or listening to a lecture

**outline** (*verb*) to give a summary of (something)

**paragraph** (*noun*) a distinct section of a piece of writing, usually dealing with

a single topic and indicated by a new line, indentation, or numbering

**paraphrase** (*noun*) a rewording of something written or spoken by someone else

**paraphrase** (*verb*) to put someone else's words in your own words

**plagiarize** (*verb*) to take the work or an idea of someone else and pass it off as one's own; or to copy from someone and pass it off as one's own

**power** (*noun*) what it takes to be able to act with intention and achieve what you want through your own actions; what is required to be in control of the outcomes of your actions; to have influence on how things are and to shape and lead the world; what is required to be able to transform the world around you with intention; (power is usually gained through relationships and is shared amongst people working together for a common goal or person)

**process** (*noun*) a series of actions or steps taken in order to achieve a particular end

**research** (*noun*) the systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions

**research** (*verb*) investigate systematically

**revise** (*verb*) reconsider and change

(something), especially in the light of further evidence or to reflect the changed situation; to change your writing as part of the writing process

**scholar** (*noun*) a researcher who studies or investigates how and why things are as they are and then shares what they have learned with others

**section** (*noun*) a part of a book, chapter, or paper that focuses on one major topic, argument, or point

**significance** (*noun*) the quality of being worthy of attention; importance; the meaning to be found in words or events

**skepticism** (*noun*) a process of questioning everything and asking for credible evidence in support of an argument, point, or belief; being critical (or careful) when reaching a conclusion about something (basing your theories on facts and logic, not opinions or false beliefs)

**subsection** (*noun*) a part of a section in a book, chapter, or paper that supports the point of a section but in more detail (the section focuses on a single topic or point, and the subsection focuses on one topic or point that supports the topic or point of the section)

**system** (*noun*) a set of things working together as parts of a mechanism or an interconnecting network that do more together than they would on their own; a set of principles or procedures

according to which something is done; an organized scheme or method

**systems-thinking** (*noun*) the process of thinking and understanding in terms of systems and model; the process of breaking things down into their components in order to better understand how they work and what they do

**theory** (*noun*) an explanation that answers how or why things are as they are; a supposition or a system of ideas intended to explain something, especially one based on general principles independent of the thing to be explained

**transform** (*verb*) to make a thorough or dramatic change in form, appearance, or character; to grow and change and become more capable; to change in ways that shift how things work in a total and complete way

**voice** (*noun*) the distinctive tone or style of a literary work or author; writing in a way that sounds like only you could have written it; to write with feeling and deep personal meaning



Alvis McCulloch-Clifton

File -

# Systems-Thinking:

## Why It Matters and How to Use It

By Gordie Budning

Section heading

### I. Introduction

indent

Systems-thinking is a way of understanding how reality really works. It is a powerful tool for understanding reality, explaining reality, and making sense of things.

Many different types of people use systems-thinking every day. Scientists use systems-thinking to explain how the human body works, how greenhouse gasses and climate change are connected, and how the universe was formed. Mechanics and engineers use systems-thinking to understand how to build and repair machines. Programmers use systems-thinking to design and code software and games. All of these people use systems-thinking to understand the world and make it better.

solded words

At the heart of systems-thinking are **systems** and **models**. The entire universe is made up of connected systems that we can only understand or explain by using systems-thinking

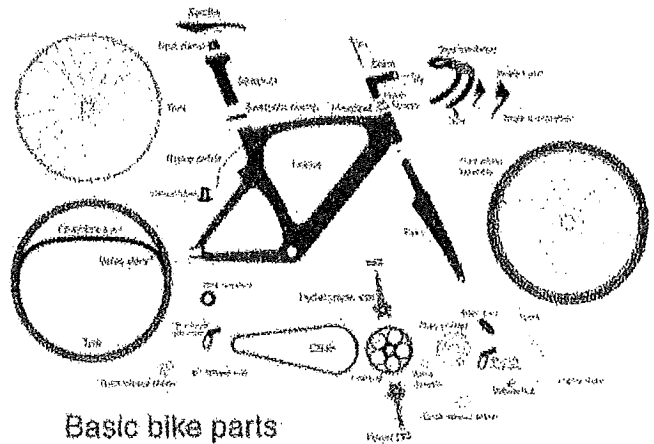
Section heading

### II. Systems

Topic sentence

#### A. What is a System?

Systems are made up of different parts that work together. These parts (called components) do more as a team than they could on their own. For example, a bike can carry a person and their stuff long distances quickly. On their own, none of the pieces of a bicycle can carry a person at all. The bicycle is a system,



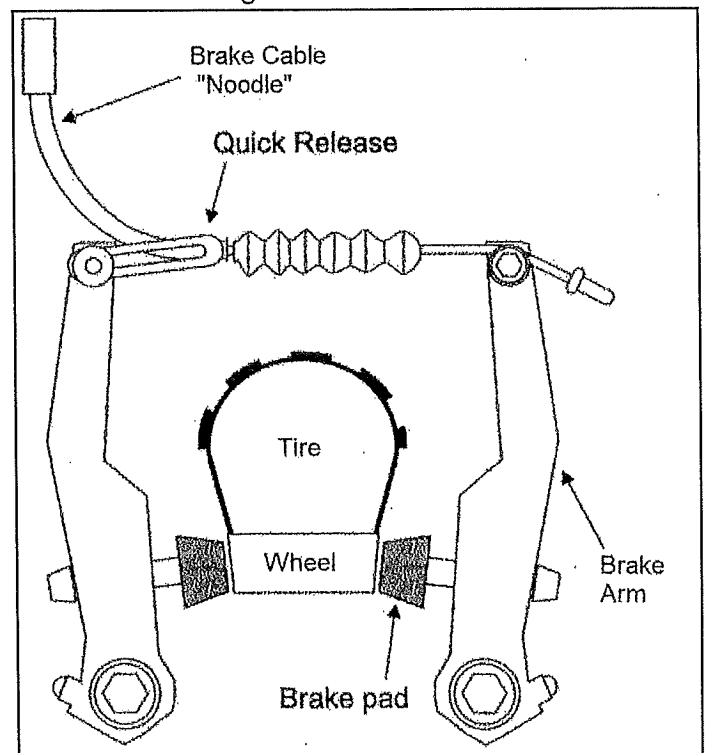
Basic bike parts

Illustration

**Figure 1.** A bicycle is one example of a system. The parts of a bicycle work together to make the bike move quickly and stop safely.

and the parts are its components. These components work together to do a job: carrying people and things.

Most systems are made up of smaller systems, called **subsystems**. For example, a bicycle has subsystems that make it stop, go, and steer. These subsystems are also made up of parts that work together.



chaf

**Figure 2.** Bicycle brakes are one example of a subsystem. When you squeeze the brake lever, the cable makes the pads squeeze the wheel. These components work together to make the bike stop.

Illustration

knobed words

Systems are all around us. Our bodies, our computers, our schools, our governments, and even our languages are all systems. All of these systems connect to make a giant system: the entire universe.

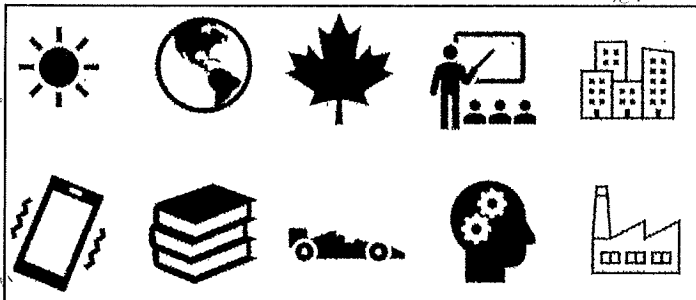


Figure 3. Our whole universe is made up of interconnected systems. How many ways do these examples connect?

### B. Inputs, Outputs, and Boundaries

Inputs and outputs cross the boundaries between systems.

**Outputs** are things that leave a system. When they leave, they cross the boundary from one system into another.

**Inputs** enter a system from outside- like the cheese Jon ate for breakfast. Most of Jon's cheese becomes part of his body as he digests it. The rest of the cheese leaves Jon's body as an **output**.

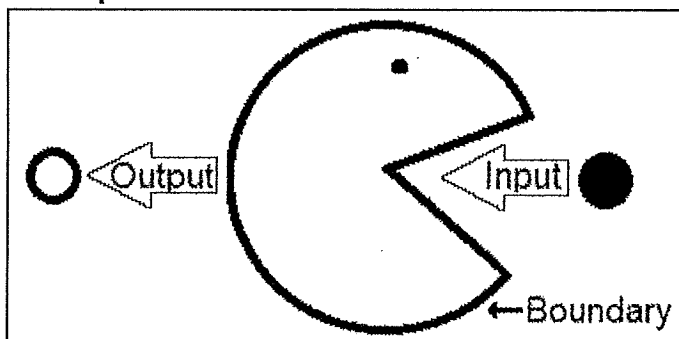


Figure 4. When Pac-man eats dots, they become inputs. They cross the boundary from the game-world into his body. Whatever is left leaves his body as an output. Pac-Man's skin is they boundary between Pac-Man and the game world.

**Boundaries** separate one system from another. For example, an egg's shell is the boundary between one egg and another. The Earth's atmosphere is the boundary between the Earth and outer space. Because everything is connected to everything

else, boundaries also connect each system to the systems around it.

## III. Models

### A. What are Models?

Models are simplified versions of systems that make their system easier to study. According to Climo, "Models are helpful because they help make sense of really complex systems by showing just one aspect, or side, of a thing at a time" (p. 673). This is important given how complex reality really is.

### B. Why use Models?

Many systems are so big, so small, or so incredibly complicated that they are almost impossible to look at or learn about. By simplifying these systems, they become easier to learn about and explain.

Science uses models to learn about and explain the systems that make up our reality. This means that we need to use Systems-thinking in order to do science.

People also use models outside of science. Models can explain anything, even opinions, ideas, and beliefs that are not based on scientific methods.

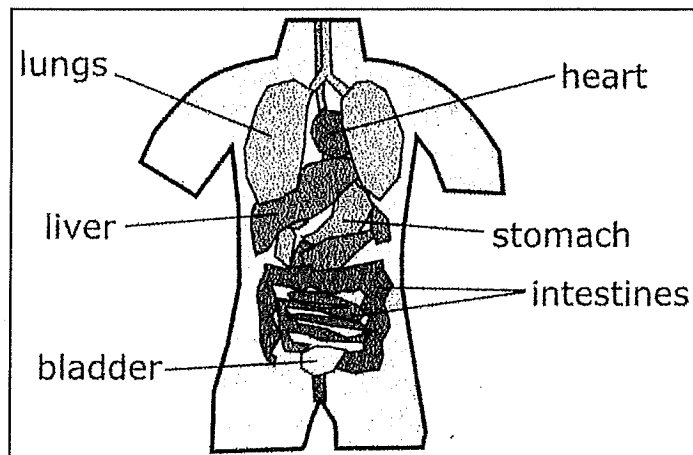


Figure 5. This diagram is a model of a system (the human body). This model shows some of the subsystems (the organs). The model is much, much simpler than the actual system.

### C. Imperfect Models

Because models are simpler than the system they explain, they must leave out a lot of information. This means that models can be used best to focus on key aspects of a system.

For example, the model in Figure 6 shows the order of the planets, shows that the planets orbit around the Sun, and shows that these orbits are elliptical. All of these things are true.

The model shown in Figure 6 is confusing if you use it to show the distance between planets and the relative sizes of the planets. For example, Saturn looks almost as large as the Sun. In reality, Saturn is much smaller than the Sun. To show the scale, you'd need to have Saturn be a super small dot.

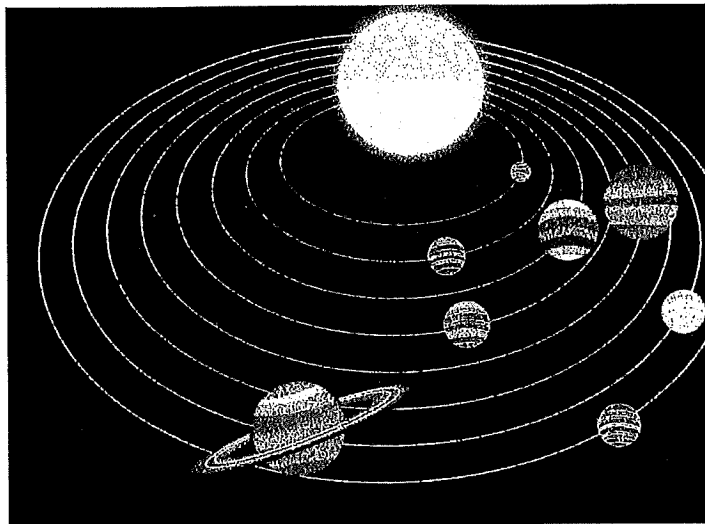


Figure 6. The orbits and order of our Solar System. Planets are not shown to scale - illustration

A different model of the solar system might show the relative sizes of the planets, but not their orbits or the distances between them. These different models focus on different key aspects of the system they are showing.

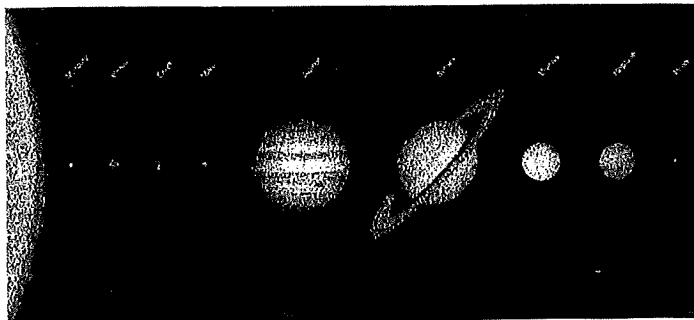


Figure 7. The sizes of the planets are shown to scale, but not their orbits or distances.

This example shows how it is helpful to look at more than one type of model to really understand a complicated system.

Topic  
Sentence

## IV. Putting It All Together with Systems-Thinking

Systems-thinking is using systems and models to explain how and why things are the way that they are. Systems-thinking looks at reality and breaks it down to understand how the parts work together to function as a whole. It explains these relationships using models. You can explain these models with diagrams, equations, and even stories. Systems-thinking is helpful if you want to understand things and have control over how things go. It is a way of thinking and it helps you break ideas and information into understandable chunks. It makes complex understanding possible.

## V. Glossary

Topic  
Sentence

**models** - representations of things that make it easier to understand one aspect of something by focusing on it (models often show the relationships between things, or how things are connected to other things)

**science** - method for understanding and explaining reality as it really is (or at least getting as close to the truth as you can) by developing theories that can be disproved (these theories must be based on the facts); science is based on understanding relationships through evidence, observation, data, logic, and critical thinking

**systems** - things or processes that are made up of parts (or components) that work together and do more together than they would on their own (systems are made of components, interactions, inputs and outputs, boundaries, and functions)

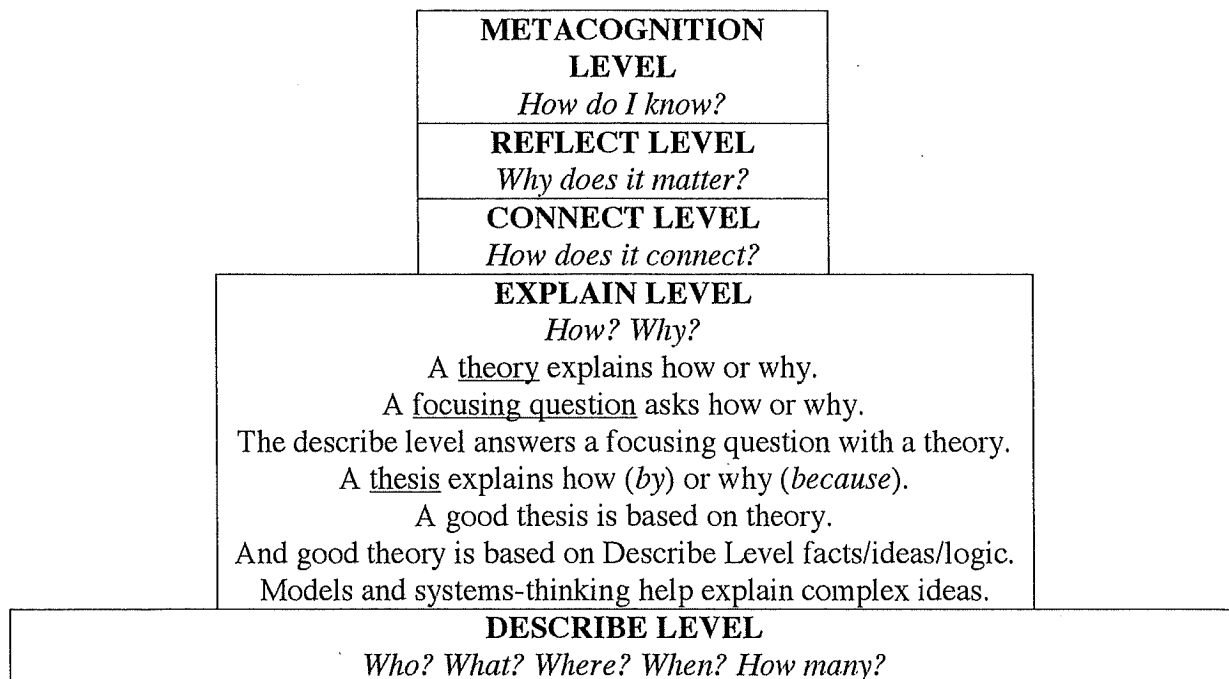
**subsystems**- systems that are parts (or components) of larger systems

**inputs**- things that go into a system from the outside

**outputs**- things that go out of a system

**boundaries**- where one system ends and another system starts

bolded words

**LEVELS OF ANALYSIS****SYSTEMS THINKING**

<b>Boundaries</b>	The boundaries set the limits of “what is the system”. You set the boundaries when defining the system.
<b>Components</b>	A system is a bunch of parts (components) that work together and do more together than they would on their own. Components are at the parts of the system. (Sub-systems are systems within systems.)
<b>Inputs</b>	Inputs cross the boundary into the system and interact with the system and its parts.
<b>Outputs</b>	Outputs cross the boundaries out of the system.
<b>Functions</b>	A system performs a function: It does something or produces something.

**ELEMENTS OF NON-FICTION WRITING**

<b>Focus</b>	Topic, Subtopic, Focusing Question, Thesis (Explain), Theme, Theory
<b>Form</b>	Text Features, Sections, Subsections, Paragraphs, Sentences
<b>Filler</b>	Describe, Explain, Connect, Reflect, Metacognition Ideas, Facts, Opinions, Quotes, Data, Stories, Examples Boundaries, Components, Inputs, Outputs, Functions
<b>Flow</b>	Roadmaps, Signposts, Transitions
<b>Feeling</b>	Connect, Reflect

**ELEMENTS OF WESTERN NARRATIVE**

<b>Characterization</b>	The development of characters through the progression of the narrative (or the telling of it) Characters often have conflicting strengths and weaknesses	<i>Filler</i>
<b>Plot</b>	Action across time (exposition, rising action, climax, falling action, denouement) (see three act structure below)	<i>Form Flow Filler</i>
<b>Conflict</b>	<b>Conflict:</b> Struggle between forces, conflict between characters, inner conflict (within characters), and conflict of action (plot)	<i>Focus</i>
	<b>Resolution:</b> More than the end of conflict but also the transformation that occurs through the resolution of conflict	
<b>Point of View</b>	The perspective the story is told from (first person, third person limited, third person omniscient) (the narrator or storyteller)	<i>Form</i>
<b>Setting</b>	<b>“Storyverse”:</b> Time and place of the story itself (can cross times and places), the era or age of the story	<i>Filler</i>
	Scenes and backdrops: Settings throughout various plot points	
<b>Theme</b>	The moral, or point, of a narrative or the overarching ideas and emotions (or experiences/realities) explored through a narrative	<i>Focus</i>
<b>Tone</b>	The author’s attitude toward a character (tone is also an element of style)	<i>Feeling</i>
<b>Style</b>	The unique voice of the author, how the author uses language (diction, voice, tone, sentence style, use of literary devices)	<i>Feeling</i>

**LITERARY DEVICES**

- allegory
- allusion
- cliffhanger
- foreshadowing
- irony, situational irony, and dramatic irony
- metaphor, simile, and analogy
- motif
- paradox
- personification
- satire
- sensory imagery
- suspense
- symbolism
- verisimilitude
- vignette