Amplify Core Knowledge Language Arts®

Core Knowledge®

Center for Early Reading

Unit 9

Digital Components | Grade 5

Chemical Matter

Grade 5 | Unit 9

Chemical Matter

Digital Components

Amplify Core Knowledge Language Arts | Core Knowledge®

Contents

Chemical Matter

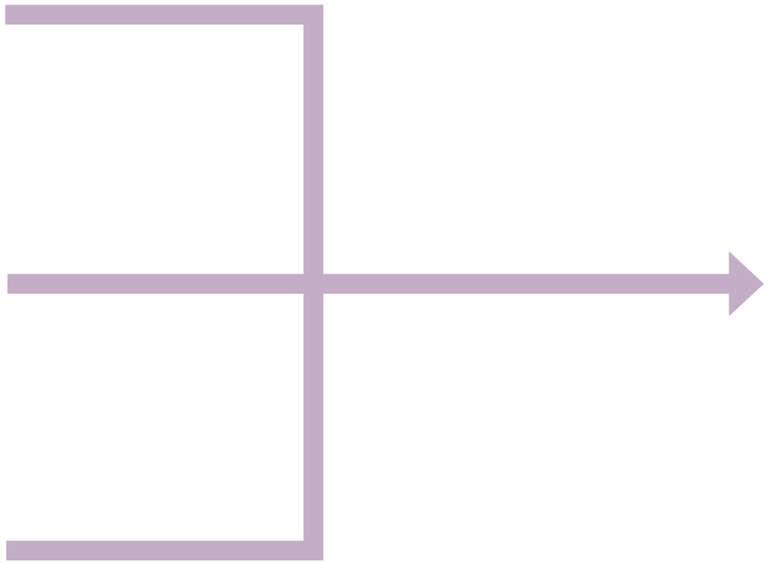
Digital Components

Scientific Definition

Palaios
(Ancient)

Sauros
(Ancient)

Logia
(Study, theory)



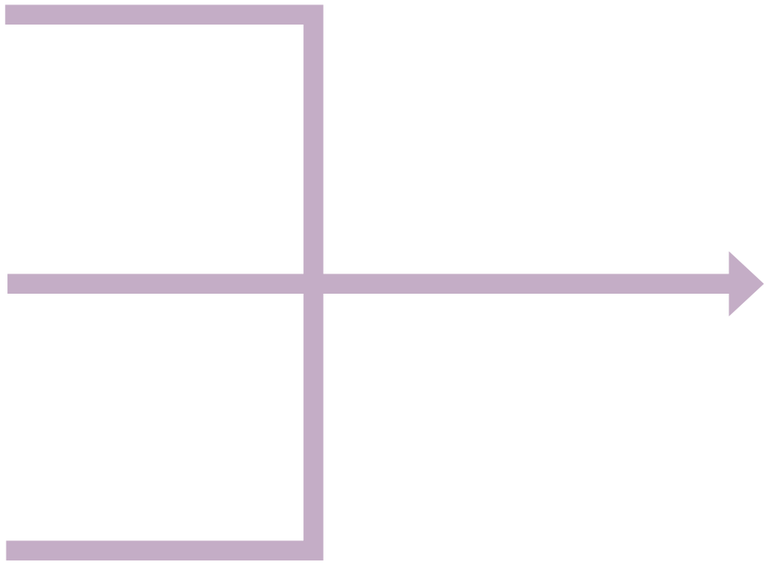
Paleontology

Scientific Definition

Tyrannos
(Tyrant, absolute ruler)

Sauros
(Lizard)

Rex
(King)

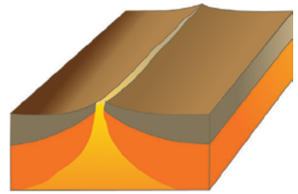


Tyrannosaurus Rex

Geology: The Changing Earth

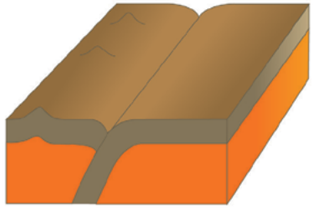
A Matter of Time

At some boundaries, tectonic plates are moving apart. As the plates separate, molten rock flows up from the mantle into the space between them, creating new crust. Mid-ocean ridges are an example of this type of plate interaction. Tectonic plates along the mid-ocean ridge in the Atlantic Ocean are moving apart at a rate of about 0.8 to 2 inches per year. That may not seem like much, but it adds up. Two hundred million years ago, the landmasses of North America and Europe were joined. So were South America and Africa. Thanks to separating plates, these continents now lie on opposite sides of a vast ocean.



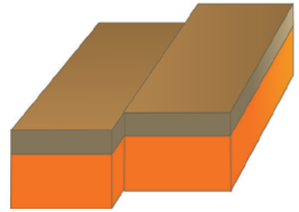
Tectonic plates move apart.

At other plate boundaries, tectonic plates are colliding, or crashing together. In some places, colliding plates slowly crash into each other. The crust at their edges gradually crumples and is pushed higher and higher, creating mountains. In other places, one of the colliding plates slides under the other. Two plates are colliding this way along the western coast of South America. A heavier oceanic plate is sliding under a lighter continental plate. Scientists call this process subduction. Subduction has created a deep ocean trench off the coast of Chile and Peru. It has also had a role in creating the towering Andes Mountains along the western edge of South America. Similar plate interactions have formed mountain ranges throughout Earth's long history.



Tectonic plates colide.

Finally, tectonic plates slide sideways past one another. It's never a smooth process. Plate edges press together hard. They often get stuck while the pressure keeps building. Eventually the pressure gets too great. The stuck edges break free, causing the plates to jerk past each other.



Tectonic plates slide sideways past one another.

Geology: The Changing Earth

Providing the Answers

The theory of plate tectonics answered many questions in geology. It explained how Wegener's Pangaea broke apart. It explained how the continents have been slowly rearranged over millions of years. The movement of the plates also explained mid-ocean ridges, deep ocean trenches, patterns in the locations of mountains, and many other features on Earth's surface. The theory has become the cornerstone of modern geology.

As plates move, interesting things happen. Most of the time, they happen incredibly slowly. Sometimes, though, the effects of plate movements are sudden and dramatic. Think earthquakes and volcanoes!

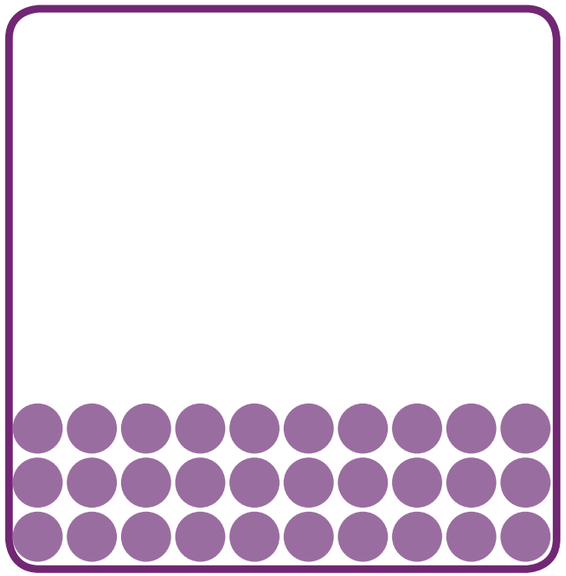
Core Conclusions

You may never have heard of the Danish scientist Inge Lehmann. Among seismologists, however, she is famous. Around 1900, scientists thought the earth had just three layers: an outer crust, a solid mantle, and a liquid core. Lehmann studied seismograph records of earthquakes. She analyzed how seismic waves changed as they traveled through Earth's interior. Lehmann collected thousands of records organized in boxes—there were no computers back then! She saw patterns in how seismic waves behaved as they moved through Earth. Lehmann concluded that Earth's core has two parts: a liquid outer core and a solid inner core. In 1936, she announced her findings and changed our view of Earth!

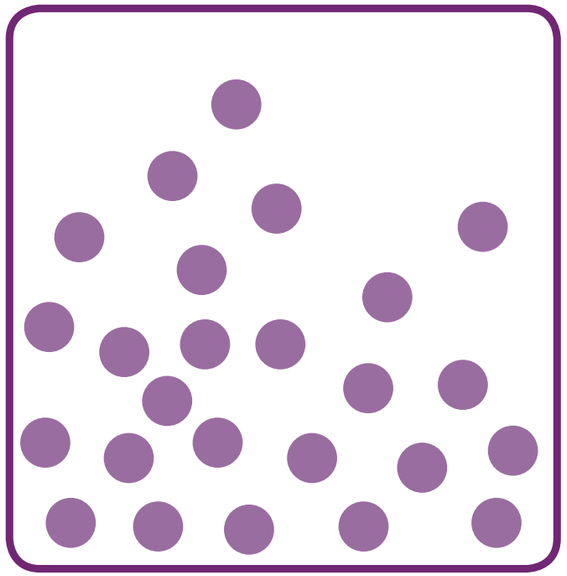
Suffix Poster

- A **suffix** is a syllable or syllables placed at the end of a root word to change the word's meaning.
- **Nouns** are words that name people, places, or things (including ideas).
- **Verbs** are words that describe an action.

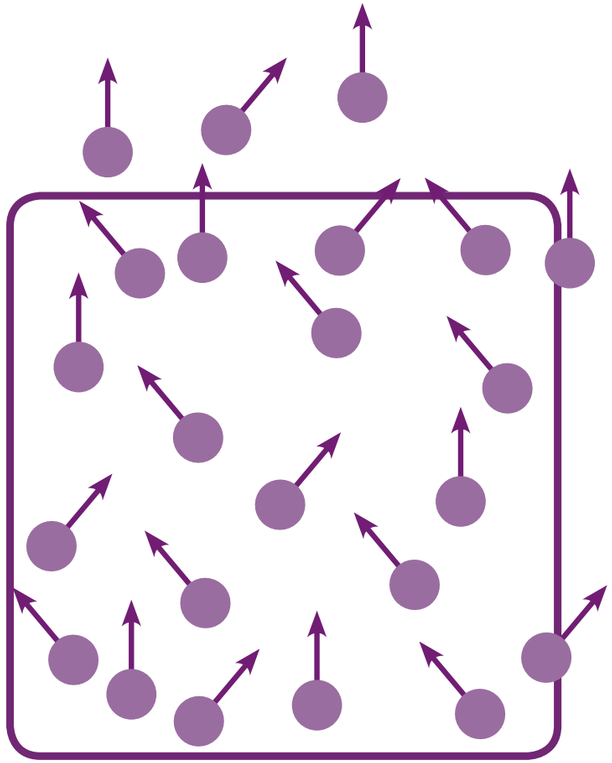
Changes in State Diagrams



SOLID



LIQUID



GAS

Sample Character Maps

Character Map 1

Character Traits and Observations

- makes friends easily
- loves chemistry and palentology

Says and Does

- drives to camp with Tess and Amy
- excavates dinosaur with Amy

Relationship with Other Characters

- Amy's brother
- talked Amy into going to Fossil Camp

Motivations/Wants

- wants to go to Fossil Camp
- wants to make an important discovery

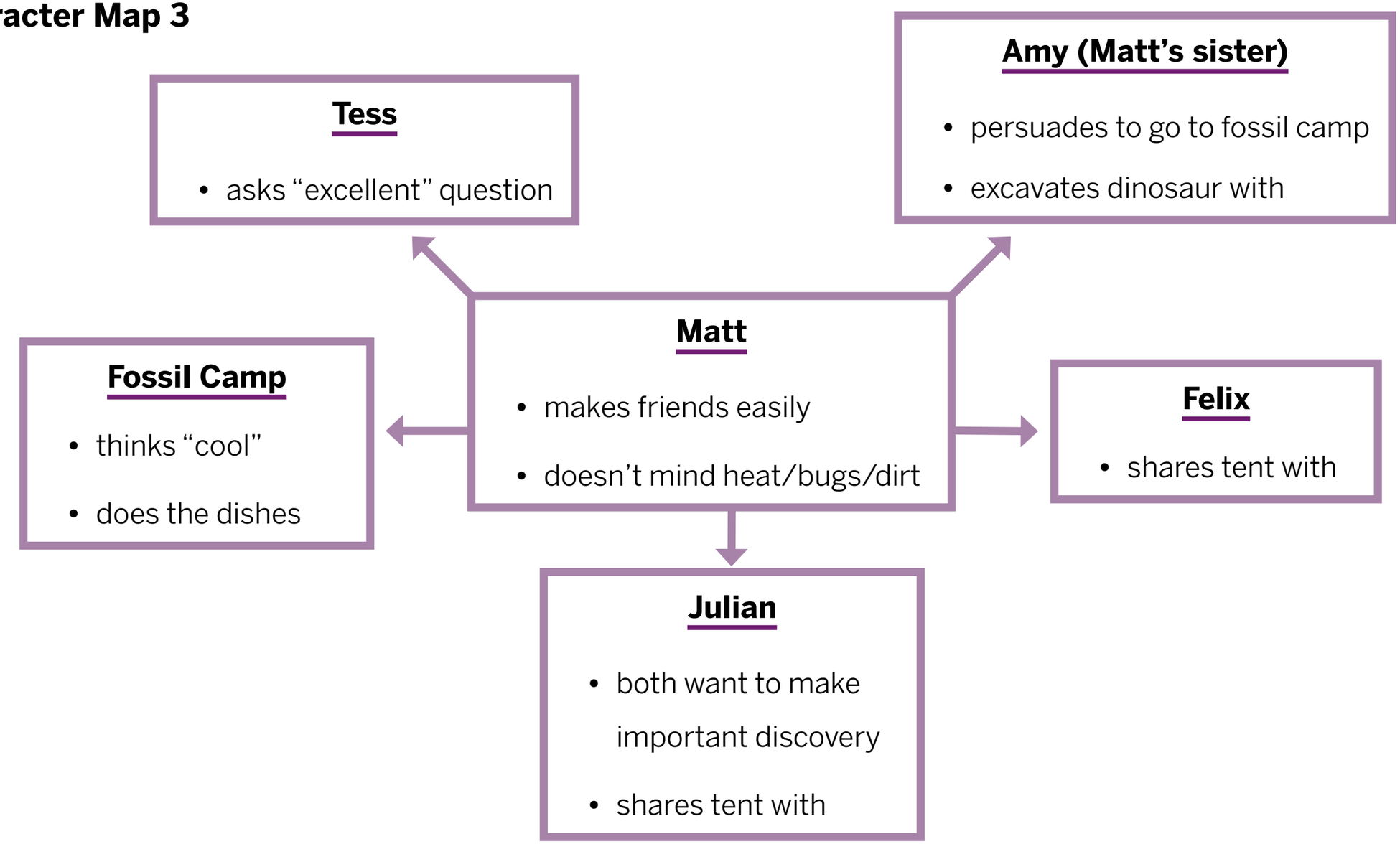
Sample Character Maps

Character Map 2

	What He Says or Does	What We Learn About His 'Wants'	What We Learn About His Character	What Else We Learn
Chapter 1	• drives to fossil camp • arrives at camp and joins everyone in lab	• wants to be at fossil camp • wants to make an important discovery	• makes friends easily • doesnt mind heat/ bugs dirt	• Amy's brother • he talked Amy and parents into going to fossil camp • thinks camp is "cool"
Chapter 2	• excavates jawbone with Amy • does dishes later that evening			• asks "excellent question" about chemistry
Chapter 3				

Sample Character Maps

Character Map 3



Sample Character Maps

Character Map 4

Matt

Matt is Amy's brother. He persuaded Amy to go to fossil camp and his parents to allow them to go. He hopes to make an important discovery. He makes friends easily and doesn't mind heat, dirt, or bugs. He thinks the camp is "cool." He has a "glow of excitement" about going to the dig site.

At the dig site, Matt excavates a jawbone with Amy. When they take a break, he asks "excellent" questions of Tess about states of matter. Later that night he does the dishes.

Tess's Rules for Observation

When I started studying chemistry, the first thing I had to learn was how to notice things properly. My rules for observation are:

1. Look carefully at everything.
2. Record what you can: mass, color, texture, state.
3. Look at how things change. If you heat it up, what happens? If you add another substance, what happens?
4. Ask, "Does what I observe match the theory?" Great scientific discoveries happen when scientists notice things not behaving the way they thought those things would. Do you see anything strange?
5. If you have a theory, test it across as many examples as you can. The more evidence you have to back up your ideas, the better.

Inspector Ellis's Rules for Detection

There's a reason I'm Amy's favorite detective. I am brilliant. No case goes unsolved if Inspector Ellis is called in (well, there was that one case with the umbrella and the penguin, but I don't like to talk about it).

Obviously, you can't become as brilliant as I am (Did I mention I was brilliant?) overnight. But you can start down the long, lonely path of becoming a great detective by following my rules of observation.

1. Look at everything. Write down what you see.
2. Collect what you can and analyze it—fingerprints, lipstick stains, everything (you can send it to the chemistry people in the lab).
3. If you've seen the crime scene before, compare what you see now with what you saw before.
4. Does anything seem out of place or unusual?
5. Interview everyone. Do their stories match up? Does anything seem out of place?
6. Is anyone behaving strangely? You can't arrest someone for being nervous, but it might give you an idea of what to look for and where.
7. Do you have a theory? Can you test it? For example, in my last case, I thought it was possible the thief had stolen out through an air vent. I tested if this was possible by sending my sidekick through the vent. I was wrong, and my sidekick became stuck, but I'd never have known this without testing my theory! (He quit later; some people can't cope with the challenge of this job.)

The Periodic Table of the Elements

1	2											3	4	5	6	7	0
							1 **H** hydrogen 1										4 **He** helium 2
7 **Li** lithium 3	9 **Be** beryllium 4											11 **B** boron 5	12 **C** carbon 6	14 **N** nitrogen 7	16 **O** oxygen 8	19 **F** fluorine 9	20 **Ne** neon 10
23 **Na** sodium 11	24 **Mg** magnesium 12											27 **Al** aluminium 13	28 **Si** silicon 14	31 **P** phosphorus 15	32 **S** sulfur 16	35.5 **Cl** chlorine 17	40 **Ar** argon 18
39 **K** potassium 19	40 **Ca** calcium 20	45 **Sc** scandium 21	48 **Ti** titanium 22	51 **V** vanadium 23	52 **Cr** chromium 24	55 **Mn** manganese 25	56 **Fe** iron 26	59 **Co** cobalt 27	59 **Ni** nickel 28	63.5 **Cu** copper 29	65 **Zn** zinc 30	70 **Ga** gallium 31	73 **Ge** germanium 32	75 **As** arsenic 33	79 **Se** selenium 34	80 **Br** bromine 35	84 **Kr** krypton 36
85 **Rb** rubidium 37	88 **Sr** strontium 38	89 **Y** yttrium 39	91 **Zr** zirconium 40	93 **Nb** niobium 41	96 **Mo** molybdenum 42	[98] **Tc** technetium 43	101 **Ru** ruthenium 44	103 **Rh** rhodium 45	106 **Pd** palladium 46	108 **Ag** silver 47	112 **Cd** cadmium 48	115 **In** indium 49	119 **Sn** tin 50	122 **Sb** antimony 51	128 **Te** tellurium 52	127 **I** iodine 53	131 **Xe** xenon 54
133 **Cs** caesium 55	137 **Ba** barium 56	139 **La*** lanthanum 57	178 **Hf** hafnium 72	181 **Ta** tantalum 73	184 **W** tungsten 74	186 **Re** rhenium 75	190 **Os** osmium 76	192 **Ir** iridium 77	195 **Pt** platinum 78	197 **Au** gold 79	201 **Hg** mercury 80	204 **Tl** thallium 81	207 **Pb** lead 82	209 **Bi** bismuth 83	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **Rn** radon 86
[223] **Fr** francium 87	[226] **Ra** radium 88	[227] **Ac*** actinium 89	[261] **Rf** rutherfordium 104	[262] **Db** dubnium 105	[266] **Sg** seaborgium 106	[264] **Bh** bohrium 107	[277] **Hs** hassium 108	[268] **Mt** meitnerium 109	[271] **Ds** darmstadtium 110	[272] **Rg** roentgenium 111	Elements with atomic numbers 113, 115, 117, and 118 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

**** The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.***

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.

Practice Sentences for Combining and Reducing

Combining

1. **(a)** The badlands were dry. Dust puffed up where they walked.

   (b) The badlands were dry and dust puffed up where they walked.

2. **(a)** Amy didn't like sleeping by the door. Snakes were nearby.

   (b) Amy didn't like sleeping by the door because snakes were nearby.

Practice Sentences for Combining and Reducing

Reducing

1. **(a)** Amy, who was bored, wandered over to the rock, which was striped, and stared at it.

   (b) Amy was bored and wandered over to stare at the striped rock.

2. **(a)** Amy liked books that involved mysteries more than romance, or science, or any other kind of genre.

   (b) Amy's favorite books involved mysteries.

Sample Police Report

Sample 1

Incident type: reported robbery

Address: 433 Smith Street

Witnesses: Mrs. Elena Baria

Evidence: fingerprints (on counter)

This morning at 10 a.m. there was a reported robbery on the corner of Smith and Jones Streets. Mrs. Baria, aged 53, called the police after seeing a man run out of the grocery store.

I arrived at the scene at 11:15 a.m. and spoke with Mrs. Baria. She told me:

1. There was glass all over the street when she turned the corner from the grocery store window. (I checked this and there was glass on the pavement.)
2. She saw a man who "looked suspicious" and was running fast out of the grocery store.
3. She could not describe the height or appearance of the suspect. She thought he was wearing a mask, but she could not be sure at that distance.

There was no CCTV footage of the event. We have found fingerprints on the counter of the grocery store. Further analysis is needed to determine if the fingerprints belong to the shopkeeper and his assistant or another.

The shopkeeper, Mr. Thompson, was not present, but we interviewed him later that day. He claimed that yesterday a large amount of money had been stolen. He also reported that his assistant was the only other person who was aware of the money. We have not been able to contact or locate the assistant and will continue to try.

Mr. Thompson reported that on the previous day:

1. He and his assistant arrived at the store with the money at 3 p.m. His assistant went into the back to compile inventory.
2. Mr. Thompson, at this time, put the money into the safe.
3. At 3:30 p.m. he and his assistant worked as usual in the store until 5:30 p.m. His assistant then left for the day.
4. Mr. Thompson left the store at 7 p.m. and went straight home. He locked the store as usual. His assistant does not have a key, he says.

Sample Police Report

Sample 2

Date: 1/1/2015
Day: Monday
Time: 11:15 a.m.
Officer on Duty: Inspector Ravitz
Location: 42 Hubbard Avenue
Nature of report: police information

This officer was on duty and patrolling when he was alerted by radio to a missing person report in the nearby area. He drove straight to the named house, arriving at 11:15 a.m. There he met Melissa Mulan, who had filed the report and was worried about the disappearance of her boyfriend, Jesus. Melissa is 28 and works full time in retail, and has been with her boyfriend for two and a half years. He was last seen the previous evening and had been due to arrive at her apartment that morning and then go on a picnic.

I asked for their movements the previous day. Melissa had met her boyfriend for dinner with her parents at 7 p.m. the previous evening at the Italian restaurant Da Loca. They had dinner, and Melissa accompanied her parents back to their home. She stayed for one cup of coffee. Jesus, she believes, would have returned to his apartment. She said he sometimes picks up documents from work late to carry on working at home.

Initially Mulan told me she could think of no reason for his non-appearance this morning. On further conversation, however, it emerged that they had a serious argument the night before. It also emerged that on previous occasions her boyfriend had taken a day or two to "cool off" after an argument.

I will check with Jesus's closest friends and family and then advise waiting several hours before further investigation.

Articles on Investigations

Article 1

What is the investigation process?

(The Metropolitan Police—the police force of London)

1. **Initial investigation—**This will involve a review of witnesses, scenes, and all other available evidence.

2. **Investigative assessment—**After the initial investigation, a decision will be made whether to transfer the crime to an investigating officer for further investigation or not. This assessment will take into account the following:

   - Seriousness of the offence
   - Likelihood of solvability (for example, availability of evidence)
   - Level of resources required proportionate to the seriousness of the offence

   There are two possible outcomes at this point:

   a) Investigation will be closed.

   b) Crime will be transferred for further investigation.

Articles on Investigations

Article 1 (continued)

3. **Further investigation—**If the crime is transferred for further investigation, this will include:

   - Taking statements from the victim and any witnesses
   - Arresting and detaining any identified suspects and formally interviewing them at a police station
   - At the end of the investigation there are three possible outcomes for the suspect(s).

     a) Charged—The suspect is told that he or she will be sent to court and what law he or she is alleged to have broken.

     b) Cautioned—An official warning is given in some circumstances.

     c) No further action—If there is insufficient evidence to charge or caution a suspect, no further action will be taken.

Articles on Investigations

Article 2

Preventing crime better than catching offenders

(telegraph.co.uk/news/politics/10025018/Preventing-crime-better-than-catching-offenders-sayschief-inspector.html)

Published: 29 April 2013

Tom Windsor, the chief inspector of constabulary for England and Wales, suggested police forces would get "more bang for their buck" if they focus on prevention rather than cure . . .

Mr Winsor . . . said the "primary purpose" of police is crime prevention.

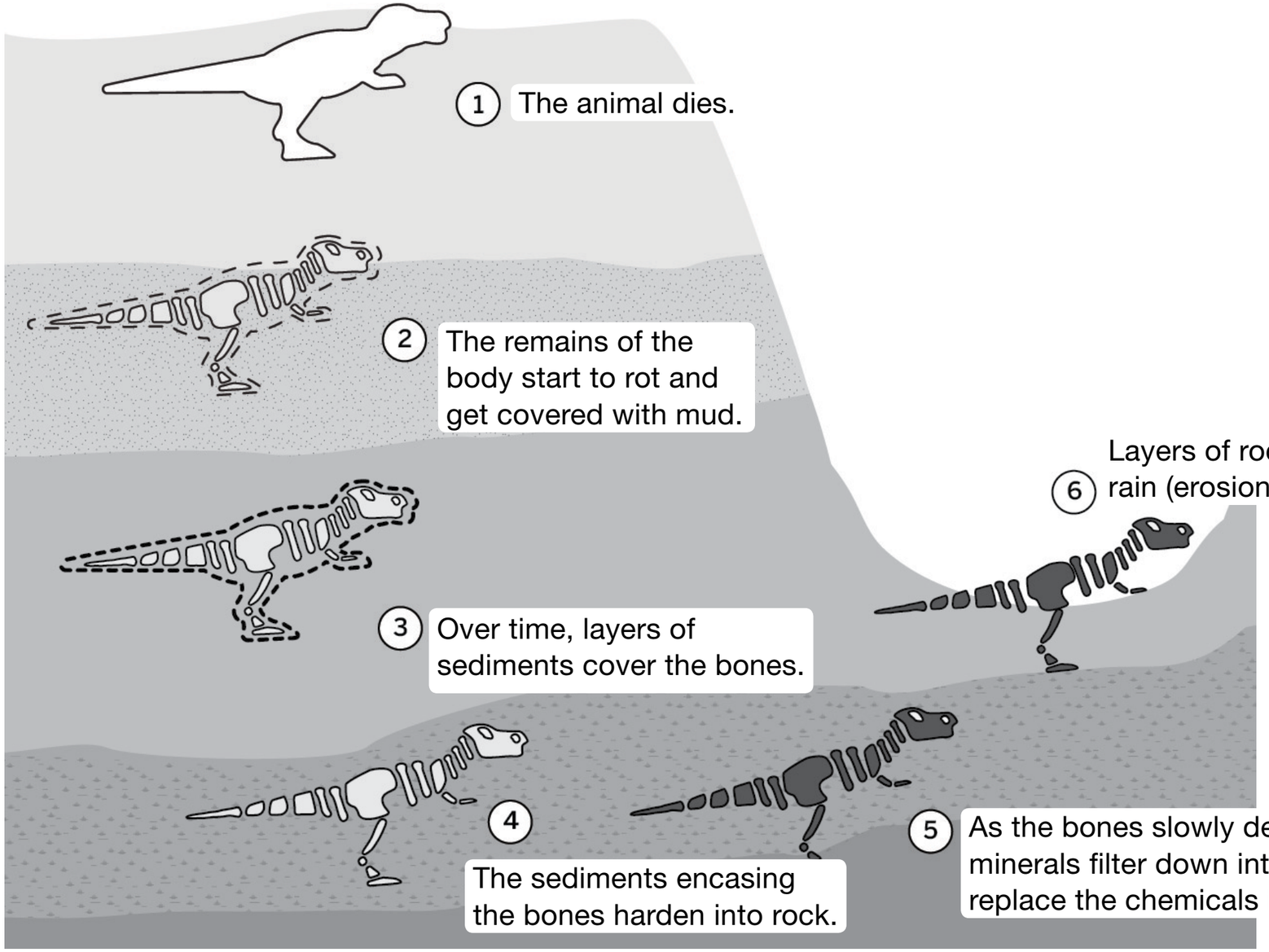
"Sir Robert Peel, who founded the modern police service in 1829 said the primary test of police efficiency is the absence of crime and disorder," he said.

"If we can prevent offences taking place and we prevent there being any victims, which is absolutely critical, and also if we save all of those costs."

Roots Poster

Roots	
A root is the main element of a word that forms the base of its meaning. A prefix or suffix added to the root can change the meaning.	

How Fossils Are Formed



Presentation Rubric

	Characters Being Presented: **Name Of Student:**	**Characters Being Presented:** **Name Of Student:**	**Characters Being Presented:** **Name Of Student:**
Was the group speaking clearly and maintaining eye contact?	**Yes / No**	**Yes / No**	**Yes / No**
Did they introduce the character clearly, using information from the text?	**Yes / No** Details:	**Yes / No** Details:	**Yes / No** Details:
Did they identify objective information about the character?	**Yes / No** Details:	**Yes / No** Details:	**Yes / No** Details:
Did they use that evidence to explain whether the character was a likely suspect?	**Yes / No** Details:	**Yes / No** Details:	**Yes / No** Details:
Did they identify subjective information about the character?	**Yes / No** Details:	**Yes / No** Details:	**Yes / No** Details:
Was it clear what the presenter would like to find out next about the character?	**Yes / No** Details:	**Yes / No** Details:	**Yes / No** Details:
Did this link to their evidence?	**Yes / No** Details:	**Yes / No** Details:	**Yes / No** Details:

Physical and Chemical Changes

	Physical Changes	Chemical Changes
Chemical Composition	Chemical composition remains the same.	Chemical composition changes.
Physical Properties	Physical properties of matter (mass, color, etc.) remain the same.	Physical properties of matter change.
Heat or Light?	You don't usually get heat or light as a result of changes in state.	Often heat or light is given off.
Reversible?	reversible	not reversible

Rules on Commas

You should place commas:

- after an introductory element (before the subject of the sentence)
- after the word *yes* or *no* when the sentence begins with that word
- before the use of a question when that question is at the end of the sentence (a tag question)

Word Choices and Fill in the Blanks

Word Choices	Sentence
mislaid, admitted, omitted, dismissed	Amy was ready to write down the final clue when she realized she had _____ her notebook!
missile, remit, mission, permission	Amy's _____ was clear: to find the culprit.
emitted, omitted, committed, permitted	The police officer _____ the message across the radio to the Sheriff.
submitted, dismissed, committed, mislaid	Matt _____ Amy's suggestion with a shrug.

Roots Poster

Roots	
A root is the main element of a word that forms the base of its meaning. A prefix or suffix added to the root can change the meaning.	

How to Help Identify the Guilty Party!

Motive: Did the suspect have a reason to want to steal the fossils? What evidence do we have for that?

Example: *Someone who loses money because of a robbery probably does not have a motive.*

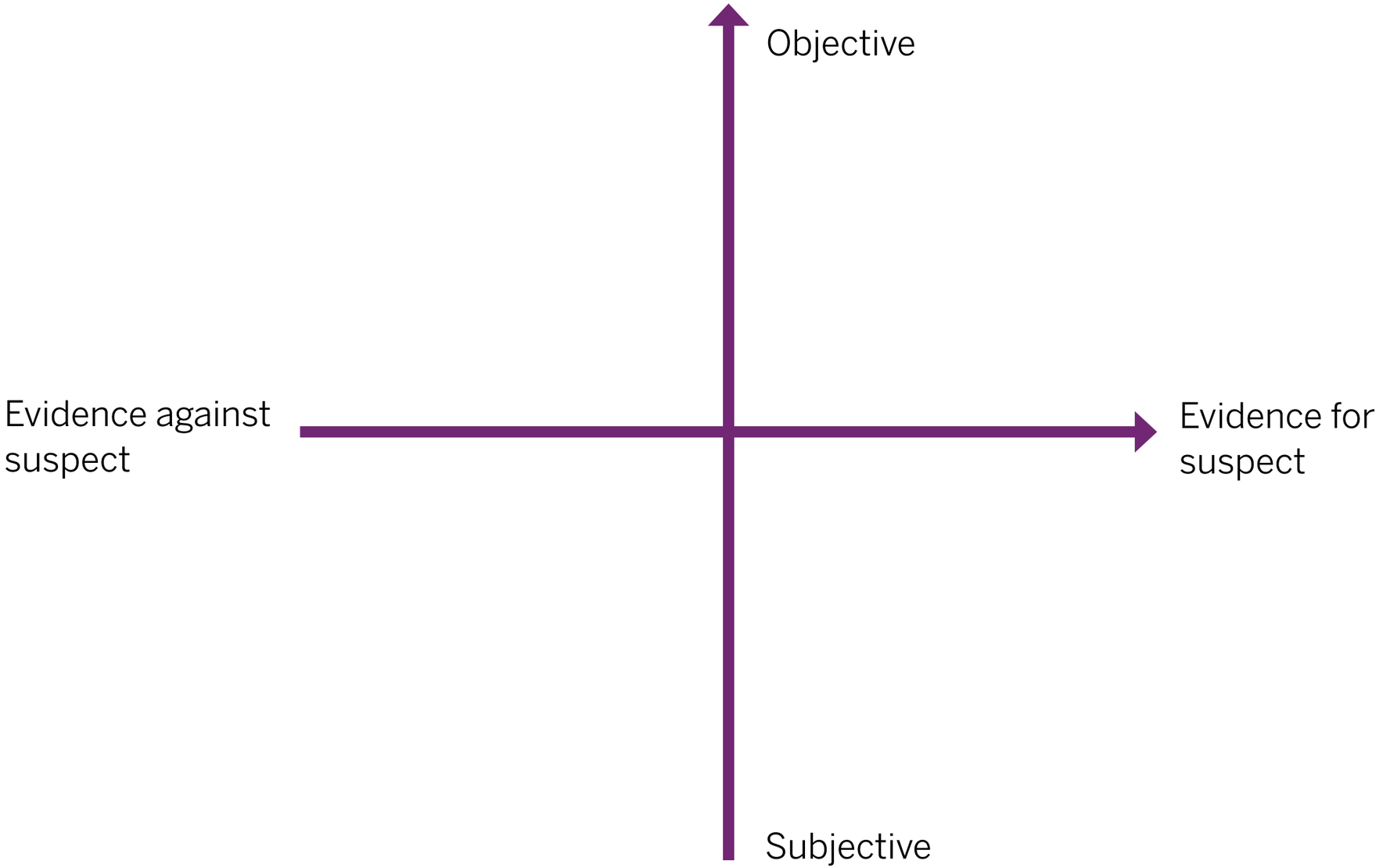
Means: Did the suspect have the practical ability to steal the fossils?

Example: *A little old lady probably did not have the strength to wrestle someone to the ground.*

Opportunity: Did the suspect have a chance to steal the fossils without being observed?

Example: *If someone was in a casino all night, and lots of people saw him or her there, he or she probably did not have the opportunity to steal something many miles away.*

Organization for Evidence Board



Evidence Boards

Evidence Boards

	Name of suspect accused: **Students in small group:**
Was the group speaking clearly and maintaining eye contact?	**Yes / No**
Did they clearly state who they were accusing?	**Yes / No**
Did they identify a clear motive, using evidence from the text?	**Yes / No** Details:
Did they identify a clear motive, using evidence from the text?	**Yes / No** Details:
Did they explain how the suspect had the opportunity to commit the crime, using evidence from the text?	**Yes / No** Details:
Was it clear when evidence was subjective and when it was objective?	**Yes / No** Details:
Do you think the evidence was convincing? Why or why not?	**Yes / No** Details:

Perfect Tense Verbs

1. Past Perfect

An action that was completed in the past before something else happened:

"I had lunch before I went to the cinema."

2. Future Perfect

An action that will have been completed at some point in the future:

"I will have solved four more cases by June."

3. Present Perfect

Includes:

An action that was begun in the past and continues in the present:

"I have already run three miles!"

An action done several times in the past and continued in the present:

"I have played the piano since I was four."

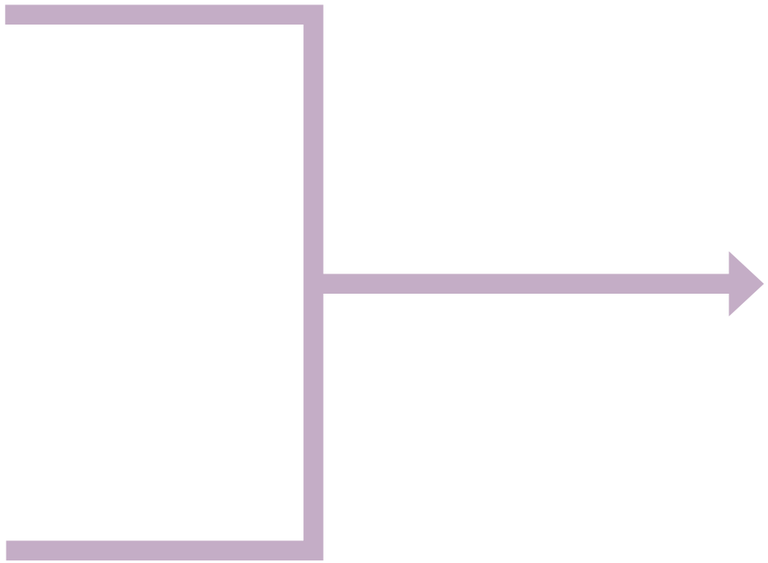
On the board/chart paper write the following sentences:

"The police had interviewed the suspect before they cracked the case."
"Yesterday when I arrived home I realized that someone had broken in!"
"Amy was disappointed at the bookstore because she had read all the detective novels."

Scientific Definition

Photo
(Light)

Synthesis
(Putting together)

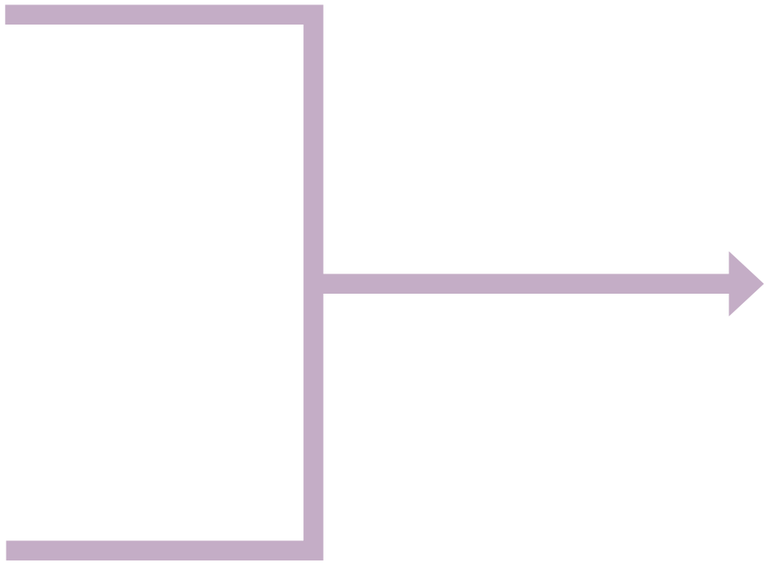


Photosynthesis

Scientific Definition

Photo
(Light)

Graphos
(Writing/writer)

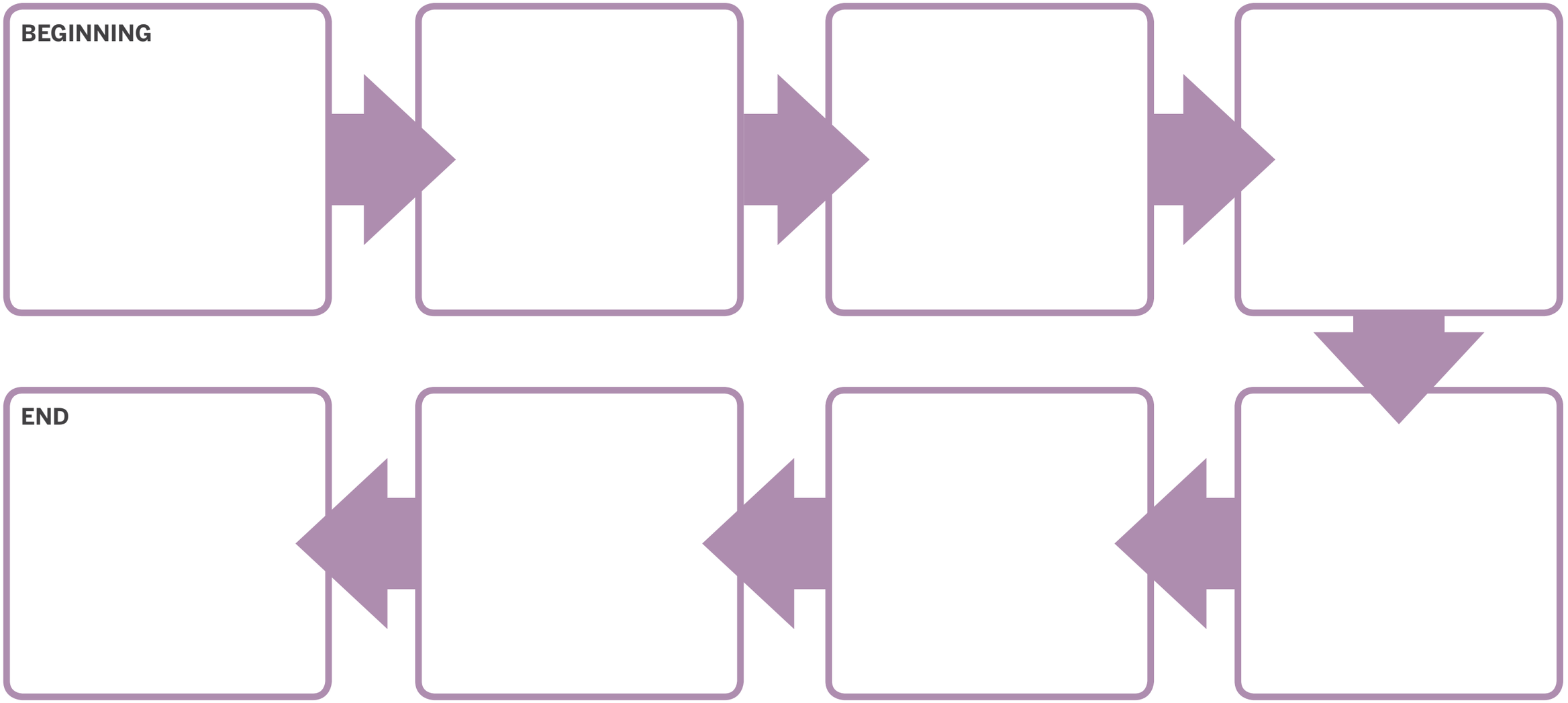


?

“My Story” Details Chart

	Details	Description—words I plan to use
Setting	a space station in the year 3030	alien, crowded, diverse
Characters	Amy, a young chemical detective	intrepid
My characters’ “wants”	Amy wants to figure out why she’s there. The chief scientist on the space station wants to be famous. The apprentice wants to be noticed by the chief scientist.	
How will my story begin?	Amy wakes up to find herself in a pod, with no memory of how she got there.	
How will my story end?	Amy proves the space station is an elaborate hoax!	
The plot (sequence of events)	(see plot diagram)	
What scientific content might I use?	Amy shows that the “scientists” who brought her there were using incorrect science: they must be actors!	

Plot Diagram



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