

2018

# ACT Strategies & Solutions

DEVELOPED BY:  
JOY RICH

[JOYRICHTHINKBIG@GMAIL.COM](mailto:JOYRICHTHINKBIG@GMAIL.COM)



## ACT ENGLISH STRATEGIES AND SOLUTIONS

### English Test Construction

- The ACT English test (45 minutes) includes five passages with 15 questions each for a total of 75 multiple-choice questions.
- The passages cover a variety of subjects, ranging from historical discussions to personal narratives.
- The questions are divided into two main categories: Usage/Mechanics and Rhetorical Skills.
- Usage/Mechanics questions test Basic English usage and grammar skills, while Rhetorical Skills questions test the ability to express an idea clearly and concisely.
- Write on the text so your eye doesn't have to go find something twice
- Underline key word in first sentence, first paragraph, middle paragraph, last sentence last paragraph.
- Go back and circle center word in first, middle, and last line of each paragraph that jumps out (do very quickly) then draw a connecting line between the circled words and review to yourself quickly; it creates a "skeleton" of the passage.
- Now attempt to answer the questions and look back to find key words that you've underlined or circled to answer questions
- **Start by reading and answering passage 4, then complete 3, then 2, then 1**
- The first passage has five questions that require students to interpret which is a "time suck" that will cause you to rush through the remaining three passages.

### English Strategy #1: Memorize the Directions

- **English Test Directions:** *"The test is broken into five passages, each with 15 questions."* This comes out to 75 questions, meaning you have just 36 seconds per question! You'll have to keep your pacing up during this section to answer all the questions.
- **The directions clearly state the format of the test:** *"Certain words and phrases are underlined and numbered, the questions each present alternatives for the underlined portions."*
- The English test is designed to help you move quickly between the question and the part of the passage it's asking about.

### **Tip #1: Read the Whole Sentence**

- This tip is vital for the ACT English section. Most of the questions will ask you how to change the underlined portion of a sentence. **Don't just read the underlined portion.** Reading the whole sentence is imperative to correctly answering the questions.
- The phrases that are not underlined in the sentence often provide essential information to determine whether there is an error in the underlined portion.

### **Tip #2: Don't Assume That There Must Be an Error**

- Do not fear the "**NO CHANGE**" option. If a sentence seems fine, look at the differences between the answer choices to understand what concept the question is testing and determine whether that error is present in the original sentence.
- The NO CHANGE answer tends to be more common than expected if all answer choices were distributed evenly.

### **Tip #3: Don't Rush**

- This tip may seem obvious, but it's important to think about what you are reading as you're taking the test. Make sure you read and understand the relevant sentences and questions before marking your answer.
- It is better to have to guess at the end or skip the more time consuming big picture questions than to rush through questions and make careless mistakes.

### **Tip #4: Grammar Rules RULE!**

- On the ACT English section, you should primarily use your knowledge of grammar rules for Standard English to answer the grammar questions. Don't rely on your ear for what sounds right, except on [idiom](#) questions.
- Many correct sentences may sound wrong to you, but the ACT includes questions on rules that are often broken in informal spoken and written English.

### **Tip #5 Simple is Best**

- Some of the most common grammar errors on the ACT English section are fairly easy to fix. If you're able to identify these errors, often you can correct them with simple changes.
- **Always remember to "Edit Down" on the ACT, you will never ADD words always when given the option will eliminate words.**

### **Redundancy/Wordiness**

- Redundancy and wordiness errors can be fixed by eliminating words or by making a sentence more concise. If a sentence makes sense without some of the underlined words, get rid of them.
- Focus on picking the answer choice that provides all the necessary information and nothing more in the most straightforward way possible.
- While the phrase "being the place in which" doesn't contain a specific grammatical error, it's unnecessarily wordy. Every word or phrase in the passages on the ACT English should serve an essential purpose. How could the phrase be more straightforward and concise?

### **Tip #6: Eliminate Identical Errors**

- If two answers are functionally identical, they must both be wrong. For example, if there is a question about transitions and two of the answer choices are "furthermore" and "moreover," you can determine that both are wrong because there is no way to differentiate between the two options.

### **Type of Question #1: Author's Technique Questions**

- Author's technique questions are presented in a non-standard format. (no underlined portion of text)
- The question number can usually be found in a box in the text, or it will be noted that the question refers to the passage as a whole.
- These items pose a question and then offer four possible responses, so logic and reasoning play an important role in the questions.
- Example #1: Author's Technique Questions
  1. The purpose of the preceding sentence is to:
    - A. Emphasize the inappropriateness of the aquariums at that time.
    - B. Illustrate the fact that the importation of goldfish produced a corresponding need for small containers.
    - C. Contradict the assertion made earlier in the paragraph that the English kept goldfish in glass containers.
    - D. Explain why goldfish could not live for long in small containers.

### **Type of Question #2: Author's Goal/Purpose Questions**

- Author's goal/purpose questions ask you to determine how a specific sentence or phrase fulfills the author's stated purpose.

- Author’s goal/purpose questions are phrased in this way:
  - Which answer choice would best fulfill (some stated purpose)?
- A portion of a sentence will be underlined, and you have to analyze each choice to determine which one best helps the author fulfill the purpose given in the question.

### General Strategies for Author’s Goal/Purpose Questions

1. Look for clue words/phrases like “about” or “that indicates.” (The intended purpose usually follows directly after these kind of words or phrases.)
2. Determine what the focus of the question is by circling words or phrases that state the intended goal or purpose.
3. Consider the conciseness, tone, and formality of the answer choices. (They should be the same as the rest of the text.)

### Tip #7 Organization: Macro Logic

Macro-logic is the skill of putting the parts of an essay in the right order. Fortunately, on the ACT, there are tons of clues as to what order sentences and paragraphs should go in.

- Macro Logic Example

Can you spot the out-of-place sentence(s) in the passage below?

- *[1] He wore a sailor’s uniform and used papers given to him by a free black sailor, showed his ingenuity and courage. [2] After a number of previous failed attempts, Douglass finally escaped to freedom. [3] He took two boats and two trains to get from Havre de Grace, Maryland to a safe house in New York City, completing his journey to freedom in less than twenty four hours. [4] He received the uniform from Anna Murray, a free black woman in Baltimore who later became his wife.*

### Type of Question #3: EXCEPT, NOT, or LEAST Questions

- Some of the ACT English questions contain test are asked with words like “EXCEPT,” “NOT,” or “LEAST” in them.
- Circle the word (“EXCEPT,” “NOT,” or “LEAST”) to remind yourself that you are looking for one “wrong” answer among three “right” answers.
- Once you understand the question, *write down your task*. For example, if a question asks, “Which of the following does NOT match the tone of the passage?” your task might be to “eliminate choices that fit the tone.”

### Tip #8: Time Management

- You may choose to focus more closely on the underlined portions of the passage.

- In this strategy, move directly from one sentence that contains an underlined portion to the next.
- Remember: you still need to read the entire sentence and answer the *specific* questions as you go.
- If you have time, you can go back to the whole text questions at the end.

**Tip #9 Determine Now, Later, or Never**

- Spending too much time on the hardest problems means you may rush through the easiest. Instead of working questions in order, ask yourself whether a question is a Do Now, Later, or Never. (Every question has the same score value. You don't get more points for a hard question!)
- **NOW:** Does a question look okay? Do you know how to do it? Do it now.
- **LATER:** Will this question take a long time to figure out? Leave it and come back to it later. Circle the question number for easy reference.
- **NEVER:** Know the topics that are your worst. If you do not know where to begin, don't waste time on those questions. Instead, use more time to answer the Now and Later questions accurately.

**Tip #10: "Letter of the Day"**

- **Have a pre-specified "Letter of the Day" like (A)/ (F) or (B)/ (G) to fill in automatically so you don't use extra time deciding which answer choice you want.**

**Topics to Review from 6<sup>th</sup>-8<sup>th</sup> Grade:** *"62.5% of all questions on the ACT are derived from material covered prior to students exiting 8<sup>th</sup> grade."* – ACT.org

**Punctuation: Commas**

- **Use commas to separate words and word groups in a simple series of three or more items.**
  - *We had coffee, cheese, crackers, and grapes.*
- **Use a comma to separate two adjectives when the adjectives are interchangeable.**
  - *It was a vibrant, massive painting.*
- **When starting a sentence with a dependent clause, use a comma after it.**
  - *Since Jim needed a quiet place to concentrate, he studied for his chemistry quiz in the library.*
- **Use commas to set off nonessential parts of the sentence.**

- *The woman, knowing it was late, hurried home.*

### **Punctuation: Common Errors**

Unnecessary Commas- Some of the comma questions on the ACT can be a little tricky and require you to know your comma rules well, but many comma questions simply require you to get rid of unnecessary commas. If you're unsure if a comma is needed, the general rule is to go with no comma.

### **Punctuation: Apostrophes**

- **Apostrophes are used two ways on the ACT: to show possession and to create contractions.**
- To form possessives of nouns:
  - *Laura's hat*
  - *The kids' toys*
  - *The tree's leaves*
- Note that the singular possessive *Laura's* has the apostrophe before the *s*, while the plural possessive *kids'* has the apostrophe after the *s*.

### **Punctuation: Colons**

- **Use a colon after an independent clause when it is followed by a list, a quotation, appositive, or other idea directly explains the independent clause.**
  - *The vote was unanimous: the older candidate had won.*

### **Punctuation: Semicolons**

- **Use a semicolon to join two independent clauses that are relatively short and are closely related.** Example: *I'm not sure how to get there; let's get directions.*
- **Use a semicolon to join two independent clauses when the second clause begins with a conjunctive adverb (*however, therefore, etc.*) or a transition (*in fact, for example, etc.*).** Example: *The basement is scary; thus, I do not go down there alone.*

### **Punctuation: Dashes**

- **Dashes are used to set off or emphasize the content enclosed within dashes or the content that follows a dash. Dashes place more emphasis on this content than parentheses.**
  - *Upon discovering the errors—all 124 of them—the publisher immediately recalled the books.*
- **TIP: Students will not likely be asked to choose between correct use of dashes and correct use of parentheses. There will be errors of some kind in the three distractors.**



### **Punctuation: End Punctuation**

- **Use a period at the end of a sentence that makes a statement.**
  - *He will try again.*
- **Use a question mark after direct questions.**
  - *Where are we?*
- **Use (rarely) an exclamation point at the end of a sentence to express strong emotion.**
  - *Stop it!*

### **Grammar and Usage: Idiomatic Expressions**

- **Idioms are expressions that have an accepted meaning that is different than the actual words they use, such as "raining cats and dogs" or "kick the bucket." Idioms are not tested on ACT.**
- **However, the English language also has idiomatic phrases made of words that always go together in common usage and are not necessarily determined by grammar rules. Idiomatic expressions are also tested on the ACT.**

### **Examples**

- Error: Maria stumbled in her old rocking horse in the garage.
- Corrected: Maria stumbled upon her old rocking horse in the garage.
  
- Error: Loud guard dogs keep burglars in bay.
- Corrected: Loud guard dogs keep burglars at bay.
  
- **How are idioms tested on the ACT English section?**
  - prepositional idioms; and
  - idioms with gerunds/infinitives

### **Grammar and Usage: Prepositional Idioms**

- **For prepositional idioms, you must know which prepositions to use with a given word based on the context of the sentence.**  
For example, you should say that you "wonder about" something, not "wonder on" something. You're "suspicious of" something, not "suspicious by" something.

### **Grammar and Usage: Idioms with Gerunds or Infinitives**

- Gerunds are verbals that are used as nouns and end in "ing." Examples of gerunds include skipping, talking, and performing.

- Infinitives are verbals that can be used as nouns, adjectives, or adverbs and are constructed by using the word "to" plus a verb. Examples of infinitives include to do, to analyze, and to explain.
- So what are some examples of idioms with gerunds or infinitives? The correct phrase is "capable of being," not "capable to be." The proper idiomatic expression is "regarded as being," not "regarded to being." For these types of idioms, you need to know which preposition to use and whether to use a gerund or an infinitive.

### Grammar and Usage: Verb + Preposition

- The ACT particularly loves one type of idiom: **verb + preposition pairs**. They always want to know if you know which is the correct preposition, as in the incorrect sentences below.

#### Examples

Error: The show was followed on an encore.

Corrected: The show was followed by an encore.

### Grammar and Usage: Verb Tense

There are six basic verb tenses, two for each time period:

1. Present: *They sing.*
2. Present Perfect: *They have sung.*
3. Past: *They sang.*
4. Past Perfect: *They had sung.*
5. Future: *They will sing.*
6. Future Perfect: *They will have sung.*

**All of these tenses are created out of three forms of "to sing": *sing* (present), *sang* (past), and *sung*(past participle). As you can see, some of the correct verb forms are created by adding forms of the words "have" and "do." The general rule is to avoid unnecessary shifts in verb tense in a single text.**

### Grammar and Usage: Subject/Verb Agreement

- Nouns and verbs are both parts of speech with number: they are written differently if they refer to just one thing or multiple things. One dog runs fast, for example, but two dogs run fast.
- Number agreement just means that the noun and the verb have the same number (singular or plural).
- Subjects and verbs must agree regardless of where they appear in the sentence.

#### Examples

Error: The writing in those paragraphs are absolutely horrible.

Corrected: The writing (*singular*) in those paragraphs is (*singular*) absolutely horrible.

### Grammar and Usage: Comparison

- **These are pretty simple. Comparisons between two things are formed by either using “more” or “less” before an adjective or adding -er at the end of the adjective.**  
*Bill is more friendly than Louis.*  
*Greg is taller than his brother.*
- **Comparisons between three or more things are formed by either using “most” or “least” before an adjective or adding -est at the end of the adjective.**  
*Lucy was the least confident student in the class.*  
*The cheetah is the fastest land animal.*
- **The ACT tests this skill by mismatching the types of comparison.**

### Grammar and Usage: Commonly Confused Words

#### Its vs. It's

- *It's* is a contraction for *it is* or *it has*.
- *It's* (*It is*) *too late*.
- *Its* shows possession, like *his* and *her*. (No possessive pronouns have an apostrophe.)
- *These are its footprints.* (“*These are it is footprints*” is incorrect, so you will know not to use an apostrophe.)

#### Their vs. There vs. They're

- *There* refers to a place.

Example: *There* is a terrarium in the first building; it is over *there*.

- *They're* is a contraction of *they are*.

Example: *They're* not in this building.

- ***Their* is the possessive pronoun.**

Example: *Their* house is on the next street.

#### To vs. Too vs. Two

- *Two* is a number.

Example: *There were two books on the table.*

- *Too* means "more than enough" and "also."

Example: *After we got our dinner for free, they gave us too much ice cream for dessert, too!"*

- *To* indicates direction and action.

Example: *We're going to the park to play basketball.*

#### Then vs. Than

- *Then* is an adverb, often used to situate actions in time.

Example: *That was then; this is now.*

- *Than* is a subordinating conjunction used mainly in making comparisons.

Example: *Shaq is taller than Kobe.*

### "Might have" vs. "Might of"

- "Might have" is correct. "Might of" is not.

### Grammar and Usage: Pronouns

- A pronoun is a word that replaces a noun. Nouns only change forms for singular and plural distinctions, but pronouns may change their forms if they're used in different ways.

### Grammar and Usage: Subject vs. Object Pronouns

- Nouns, in relation to verbs, can be subjects or objects. Subjects "do" verbs and objects have verbs "done" to them: a dog (the subject noun) chases (the verb) its tail (the object noun).
- Regular nouns like *dog* or *tail* do not change depending on whether they are subjects or objects, but most pronouns do.
- For example, in the phrase "she likes him," the woman is the subject, so the pronoun is *she*; in the phrase "he likes her," the woman is the object, so the pronoun is *her*.

### Sentence Structure: Parallelism

- Parallel structure means using the same pattern of words for two or more words or ideas in a sentence. Using parallel structure shows that the words or ideas have the same level of importance and makes the sentence easier to understand.
- The basic parallel structure rule is that the things in a list should be in the same grammatical form. If you're listing three things, the construction of that list should be *noun, noun, noun*, or *verb, verb, verb*, or *gerund, gerund, gerund*, etc. Any inconsistency within the list is an error in parallel structure.

*\*See Appendix for Punctuation and Grammar Worksheets created by Ken Stansbury from Page High School.*

## ACT READING STRATEGIES AND SOLUTIONS

The reading sub-test is important because it gives us information on how well a student can use and comprehend complex text.

- Reading Section Format
- The ACT Reading section consists of four passages, each of which has 10 associated questions, for a total of 40 questions which you have 35 minutes to answer.
- The passages are approximately 750 words in length, with lines numbered for reference.
- They are always drawn from the same four types of topics: Prose Fiction, Social Science, Humanities, and Natural Science.
- Types of questions: line references, specific detail, inference, big picture.

**\*Top Tip- Start by reading and answering the questions for the last passage first then work backwards. The first passage has mostly inferential questions which can consume a lot of your time. Make sure to pay close attention to your answer key to make sure you are marking the correlating answers/questions.**

### Reading Strategy #1: Memorize the Directions

- The directions for the ACT reading section are simple and always the same, so you should know them well enough to not need to spend any time reading or thinking about them when you are actually taking the test. They are as follows:  
*“Instructions: On this test, you will have 35 minutes to read four passages and answer 40 questions (ten questions on each passage). Each set of ten questions appears directly after the relevant passage. You should select the answer choice that best answers the question. There is no time limit for work on the individual passages, so you can move freely between the passages and refer to each as often as you’d like.”*

### Reading Strategy #2: Time Management

- First, determine if your best strategy is to read the passage first, or the questions first.
- The only way to determine the best approach for you personally is to experiment by taking practice tests and see which way gives you the best results.
- If you are reading the questions first and find yourself running short of time, then read the passage first and then answer the questions.

**Practice monitoring your time**, know how long you’re taking on each question.

- **Know how much time you have left** while you're taking the test- 35 minutes, 4 passages, and 10 questions each.

**Establish a feedback loop** of testing, review your mistakes, test again, and identify patterns in questions you miss or skip.

- If you are spending more than 3 minutes reading and marking passages, you are risking not being able to finish all of the questions on test day.
- As you become more and more confident with your accuracy, try to get as precise as possible with the timing of your note-taking using these strategies:
  - **#1 Find the Main Idea**

- #2 Find the Author’s or Narrator’s Purpose and Attitude
- #3 Briefly Annotate the Passage (Underline as You Read)

### Reading Strategy #3: Scanning and Skimming

- After you determine what to read first, work on your skills in scanning and skimming.
- The key skill to doing well on ACT Reading section is the ability to **skim text while retaining meaning**.
- When you read the passage, don’t try to absorb and memorize all the information. Just try to get a fairly good idea of where information is located so that you can hone in on relevant details quickly after reading a question.
- Another technique is to always quickly read the first and last paragraphs before skimming over the entire passage.
- Practice “**flyovers**” – quickly skimming through non-fiction passages, paying particular attention to beginnings and endings of paragraphs.
- The beginning and end will often give you a good idea of the passage’s main idea, the tone of the passage, its purpose, and the type of audience it’s intended for.
- In some instances, you will get a clear idea of some of the content that has to be in the middle paragraphs in order to tie the beginning and end together in a logical way.
- Remember that **Underlining** is helpful with the scanning/skimming process.

### What is Tested: Four Abilities

There are **four major abilities** that are tested in the Reading Comprehension section of the ACT:

1. **Main Idea**- selecting the main thought of a passage; ability to judge the general importance of a passage; and the ability to select the best title of a passage.
2. **Detecting Details**- tests your ability to get a literal meaning of what is written; or to identify details.
3. **Inferential Reasoning**- tests your ability to weave together the ideas of a passage and to see their relationships; to draw correct inferences.
4. **Tone or Mood**- tests your ability to identify the dominant tone or mood of a passage – sad, mysterious, humorous, serious, etc.

### Reading Strategy #4: Underlining

- Because you are working on a clock, it is critical to work efficiently.
- As you read each passage, underline the **main idea**, **specific details**, **information that is implied**, and the **tone or mood** of the passage.
- Rather than having to re-read each passage to find the answer, your underlining will lead you quickly to the right answer.

### Types of Reading Passages on the ACT

- Prose Fiction
- Social Science
- Humanities
- Natural Sciences

**Prose Fiction**—The Prose Fiction passage is the only fictional passage on the ACT.

1. It will be an excerpt from a novel or a short story.
2. Elements to pay attention to while reading include plot, character development, tone, style, and mood.
3. Take note of who the narrator is and any sympathies he or she might express, as well as the relationships among the characters.

**Social Science** - The social sciences consist of subjects such as history, politics, economics, and psychology.

1. Names, dates, and concepts are important and should be underlined.
2. Cause-effect relationships should be considered.
3. Pay close attention to chronological order.
4. Also try to distinguish the author's personal viewpoint from the facts they are presenting.

**Humanities**—The humanities passage will discuss a cultural topic, such as art or literature, from an analytical or journalistic perspective.

Passage will contain specific information regarding either historical or contemporary figures and events.

1. Will have more of an emphasis on artistic and literary significance rather than political.
  2. Be aware of any personal viewpoints the author may be expressing.
- Natural Science

**Natural Science**—Natural science topics are drawn from the physical and biological sciences.

1. Passage will contain specific arguments and experiments along with their significance and reasoning.
2. Includes many scientific facts and concepts.
3. Pay particular attention to comparisons and cause-effect relationships while reading these passages.

### **Reading Section: Eight Question Types**

The questions on the reading section are broken down into the following eight types:

1. Identify specific details and facts
2. Determine the meaning of words through context
3. Draw inferences from given evidence
4. Understand character and character motivation
5. Identify the main idea of a section or the whole passage
6. Identify the author's point of view or tone
7. Identify cause-effect relationships
8. Make comparisons and analogies

### **Reading Tip #1 Identify Specific Details and Facts**

- Identify the most important word(s) in the question.
- This general strategy is critical for specific detail questions. Identify the word or phrase that will guide you toward the answer as you read the passage.
- Make mental notes related to the word or phrase as you read.

- If the question is a straightforward question about a fact or example from the text, your answer will likely appear in the same sentence in which the word or phrase appears -- or in the sentence before or after that sentence.
- However, be sure to read the entire passage. Understanding the main idea of the passage is often critical to choosing the correct answer for specific detail questions.
- Identify Specific Details and Facts
- Some questions will contain a key word or phrase that is a synonym for another word or phrase in the passage.
- In this case, look for the word or phrase in the passage that means nearly the same as the word or phrase in the stem.
- Some questions will simply ask you to identify the statement that is true or accurate among the answer options. In this case, take brief notes on the main idea as you read and test each answer choice against the facts presented in the passage.

### **Reading Tip #2 Determine the Meaning of Words through Context**

- Vocabulary in context questions are the questions on ACT Reading that **question you directly about vocabulary in the context of a paragraph.**
- Two ways ACT reading will question you on vocabulary:
  1. Based on how the word is used in the passage, what does that word mean?
  2. How would you sum up the meaning of a few lines or a paragraph, using one word as your answer?
- What's The Meaning of the Word in Context?
- These questions are probably among the most straightforward of all the ACT reading questions: **"Here's the word – what's the definition?"**
- **Usually always asked in the following way:**
  1. As it is used in line #10, the word *mind* most nearly means...
  2. As it is used in line 42, the word *howled* most nearly means...
- "Most Nearly Means" questions are about words that have multiple meanings.
- The test often will include an answer choice that is accurate for **SOME** definition of the word, just not the way it's used in the passage.
- What Word Is Defined By The Passage?
- These questions ask you to **recognize the definition in the passage and relate it to the answer choice** that matches it.
- In contrast to the previous question type of vocab-in-context questions, these are asking **"Here's the definition, what's the word?"**
- Strategies to answer these types of questions:
  1. Rephrase the information given in your own words.
  2. Cross out answers that clearly do not fit.
  3. Plug the definition back into the sentence.

### **Reading Tip #3 Inference Questions**

- An inference is an intelligent guess that is based on two things: current evidence and prior knowledge.
- **ACT asks "Interpret or infer the meaning of a phrase, line, or series of lines."**



- The meaning asked about in inference questions will not be directly stated in the text, which is why inference questions use wordings like “can be reasonably inferred that” or “suggests that.”
- Since there can only be one correct answer, however, the answers to inference questions **cannot** be subjective or ambiguous.
- Inference Question Subcategories
- On ACT reading, there are three main subcategories of inference questions:
  1. **Speculation**
  2. **Examination**
  3. **Deduction**
- Inference Question Subcategories Defined
- **Speculation Questions** require you to speculate about the meaning of a statement, description, or something else in the passage.
- **Examination questions** ask about the internal thoughts, feelings, or motivations of the narrator, author, or someone mentioned in the passage.
- **Deduction questions** are the simplest type of inference questions, because they only ask you to fill in missing information using your personal logic.
- Strategies to Answer Inference Questions
- **Look for Context-** read the sentences directly before and after the phrase, sentence, or lines you're given in the question to gain more context clues.
- **Answer in Your Own Words-** if you answer the question using your own words, you're far more likely to only include relevant accurate information.
- **Eliminate Answers-** based on your answer that you wrote in your own words.

#### Reading Tip #4 Understand Character and Character Motivation

- When an author writes, he must always consider why his characters behave in certain ways. Essentially, what makes them do what they do?
- Several factors go into determining what motivates a character.
  - A reader is often given pieces of a character's **backstory**, also known as **exposition**, in order to make him three-dimensional.
- Motivation is what makes characters do the things they do, and causes characters to speak or act in certain ways.
- Strategies to Understand Character and Character Motivation
- Combine your observations of the characters in the story with your prior knowledge—your own past experiences and what you already know about human nature.
- As you read a passage, pay attention to the character's **speech, thoughts, and actions**.
- One way to infer why a character behaves in a certain way is to work backward. Start with something the character does. Then, ask yourself, “What did the character want (or want to avoid) \_\_\_\_\_?”

#### Reading Tip #5 Main Idea Questions

- **What is the main idea or point of a passage or paragraph?**
- For Social Science, Humanities, and Natural Science passages, the main point is the **central argument**.

- For Prose Fiction or Literary narrative, the main point is often the **central conflict and its implications, or “moral of the story.”**
- The main point should answer the question, **“what’s the author’s point in this paragraph/passage?”** in a short sentence.
- Strategies for Main Idea Questions
- **Key Words-** Uncover key information by paying attention to words and phrases that signal changes of direction, like “in contrast,” “while,” “however,” and so on.
- **Your Own Words-** Try to formulate the answer using your own words before you look at the test's answer choices, relying only on what you read in the passage or paragraph.

#### **Reading Tip #6 Authors Point of View/Perspective**

- Author’s voice questions ask you to draw a conclusion about how an author (or narrator) feels about his or her subject.
- Approximately half of ACT reading passages are going to ask questions about the author’s point of view, so you should prepare for them as you are reading.
- As you are reading, look for clues that indicate how an author or narrator feels about something: often these are strong choices in adjectives, adverbs, or verbs.
- **Example:** The narrator recalls her childhood in a remote area of Canada with a feeling of\_\_\_\_\_.
- Rather than asking about “what happened”, **perspective questions ask “what is the perspective, attitude, or point of view** of the [person, narrator, author], **shown** in this [paragraph, series of paragraphs, passage]?”
- These questions are a little different from main point questions, but since answering them requires you to synthesize large amounts of information down into one central point, perspective questions are still big picture questions.

#### **Reading Tip #7 Identify Cause-Effect Relationships**

- The cause of something is always what happens first and the effect is the resulting outcome (or what happens second).
- Cause-effect and sequence of event questions are categorized separately by the ACT, but they are fairly similar.
- Both require you to understand what happened before something else or what happened to cause something else.
- **Example:** The narrator conveys that her dismissal from her first job resulted from\_\_\_\_\_.
- Strategies for Cause-Effect Relationships
- These questions are like detail questions in that the answer will be directly stated in the passage; however, remember that the order of events discussed in the passage are not necessarily the order in which they happened.

#### **Reading Tip #8 Make Comparisons and Analogies**

- Comparative relationship questions ask you to evaluate how two or more people, viewpoints, events, theories, or so on compare.

- **Examples:**
  - According to the author, the significant difference between the director’s opinion and the star actor’s opinion was:
  - According to the passage, high school students today are different from teenagers in the past because:

**Reading Tip #9 Make Comparisons and Analogies through Paired Passages**

- Paired passages are two short passages (40-50 lines each) that are related in some way (usually by topic).
- Each set of paired passages will have 10 questions altogether; the first few questions will be about passage A, the next few about passage B, and the final **3-4 questions will ask about both passages.**
- Adding paired passages to ACT reading is part of ACT’s push to get students to “integrate knowledge and ideas across multiple texts.”
- Paired Passages Strategies
  - ✓ **Strategy 1: Start By Answering Questions on Individual Passages**
  - ✓ **Strategy 2: Guess On Multi-Passage Questions**  
Questions that ask you to compare aspects of the two passages are more complex than those that just ask you to answer questions about one passage.
  - ✓ **Strategy 3: Eliminate Answers**  
If part of an answer is wrong, then you can eliminate it completely.
  - ✓ **Strategy 4: Practice with ACT or SAT Paired Passages Examples**
- Avoid ACT Reading “Trap Answers”
  1. **Distortion** – twists details from the passage so they are no longer correct
  2. **Misused detail** – a true statement from the passage, but one that doesn’t answer the question
  3. **Out-of-scope** – includes information not included in the passage
  4. **Extreme** – too extreme to reflect the author’s purpose (often includes words like always, never, best, worst, etc.)
  5. **Opposite** – contradicts the information in the passage

## ACT MATH STRATEGIES AND SOLUTIONS

- **Memorize the Instructions**
- You shouldn't have to read the instructions at the beginning of each section on test day. **Know all the instructions ahead of time.**

“After solving each problem, pick the correct answer from the five given and fill in the corresponding oval on your answer sheet. Solve as many problems as you can in the time allowed. Do not worry over problems that take too much time; skip them if necessary and return to them if you have time. Calculator use is permitted on the test. Calculators can be used for any problem on the test, though calculators may be more harm than help for some questions.”

### ACT Math Test Construction

- The ACT mathematics test is a 60-minute test with 60 questions that are designed to assess the mathematical skills students have acquired across the entirety of their mathematical academic career.
- The test presents multiple-choice questions that require a student to use reasoning skills to solve practical problems in mathematics.
- In preparation for the ACT mathematics test, it is essential to have general knowledge of the foundational math formulas and be able to demonstrate computational skills.
- The ACT mathematics test does not require recall of complex formulas or extensive computation.

### 24 Math Skills Tested on the ACT

#### Numbers

1. Integers
2. Rational numbers
3. Statistics
4. Probability
5. Sequences

#### Coordinate Geometry

14. Points
15. Lines
16. Polynomials
17. Conic Sections
18. Reflections

#### Algebra

6. Operations
7. Single Variable Equations
8. Functions
9. Word Problems
10. Inequalities
11. Matrices
12. Complex Numbers
13. Systems of equations

#### Plane Geometry

19. Lines and Slopes
20. Triangles
21. Polygons
22. Circles

#### Other Topics

23. Solid Geometry
24. Trigonometry

### **Algebra Question Breakdown:**

- 14 pre-algebra questions based on math terminology (integers, prime numbers, and so on), basic number theory (rules of zero, order of operations and so on), and manipulation of fractions and decimals
- 10 elementary algebra questions based on inequalities, linear equations, ratios, percents, and averages
- 9 intermediate algebra questions based on exponents, roots, simultaneous equations, and quadratic equations
- Total: 33 questions

### **Geometry Question Breakdown:**

#### **14 plane geometry questions based on:**

1. Angles
  2. Lengths
  3. Triangles
  4. Quadrilaterals
  5. Circles
  6. Perimeter
  7. Area
  8. Volume
- Total: 23 questions

### **Trigonometry Question Breakdown:**

- 4 questions based on:
  - Basic sine
  - Cosine
  - Tangent functions
  - Trig identities
  - Graphing
- Total: 4 questions

### **ACT Math Formulas**

- The ACT does not provide any formulas at the beginning of the Math Test. This means you need to memorize relevant formulas, so you can recall them quickly as needed.
- **16 Most Common ACT Math Formulas**

#### **1. Arithmetic mean (average) = Sum of values / Number of values**

Used to calculate the mean value of a given set of numbers.

Ex:  $(10 + 12 + 14 + 16) / 4 = 13$

## 2. Probability = Target outcomes / Total outcomes

Used to calculate the chances of something occurring from a set of possible outcomes.

Ex: A jar contains five blue marbles, five red marbles, and ten white marbles. What is the probability of picking a red marble at random?

$$5 / 20 = .25 \text{ or } 25\%$$

## 3. Quadratic Formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Used for determining the x-intercepts of a quadratic (parabolic) equation.

Ex: A = 1, B = -4, C = 4

$$x = \frac{-4 \pm \sqrt{4^2 - 4(1)(4)}}{2(1)}$$

$$x = \frac{4 \pm \sqrt{16 - 4(4)}}{2}$$

$$x = \frac{4 \pm \sqrt{16 - 16}}{2}$$

$$x = \frac{4 \pm \sqrt{0}}{2}$$

$$x = 4 / 2$$

$$x = 2$$

## 4. Distance Formula: $d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

Calculate the distance between two points on a coordinate plane.

Ex. Find the distance between points (6, 6) and (2, 3)

$$d = \sqrt{(6 - 2)^2 + (6 - 3)^2}$$

$$d = \sqrt{(4)^2 + (3)^2}$$

$$d = \sqrt{16 + 9}$$

$$d = \sqrt{25}$$

$$d = 5$$

## 5. Slope Formula: Slope = $\frac{y_2 - y_1}{x_2 - x_1}$

Calculate the slope (angle) of a line that connects two points on a plane.

Ex: Coordinates = (-2, -1) (4, 3)

$$s = \frac{3 - (-1)}{4 - (-2)}$$

$$s = 4 / 6$$

$$s = 2 / 3$$

**6. Slope Intercept:  $y=mx+b$** 

Formula that defines a line on a plane, given a known slope and y-intercept.

Ex: Slope = 2, Intercept point (0,3)

$$y = 2x+3$$

**7. Midpoint Formula:  $(x_1+x_2) / 2, (y_1+y_2) / 2$** 

Calculates the midpoint between two points on a plane.

Ex: Find the midpoint between (-1, 2) and (3, -6)

$$(-1 + 3) / 2, (2 + -6) / 2$$

$$2 / 2, -4 / 2$$

Midpoint (1, -2)

**8. Area of Triangle:  $\text{area} = (1/2) (\text{base}) (\text{height})$** 

Calculate the total area within a triangle based on the lengths of the sides.

Ex: Base = 5, Height = 8

$$a = 1/2 (5)(8)$$

$$a = 1/2 (40)$$

$$a = 20$$

**9. Pythagorean Theorem:  $a^2+b^2=c^2$** 

Used to calculate the length of an unknown side of a right triangle, given two sides are known.

Ex:  $a = 3, b = 4$

$$c^2 = 3^2 + 4^2$$

$$c^2 = 9 + 16$$

$$c^2 = 25$$

$$c = \sqrt{25}$$

$$c = 5$$

**10. Area of Rectangle:  $\text{area} = \text{length} \times \text{width}$** 

Calculates the total area within a rectangle shape.

Ex: length = 5, width = 2

$$a = 5 \times 2$$

$$a = 10$$

**11. Area of Parallelogram: area = base x height**

Calculates the total area within a parallelogram.

Ex: base = 6, height = 12

$$a = 6 \times 12$$

$$a = 72$$

**12. Area of Circle:  $\pi * r^2$**

Calculates the total area within a circle.

Ex: radius = 4

$$a = \pi \times 4^2$$

$$a = \pi \times 16$$

$$a = 50.24$$

**13. Circumference of Circle: circumference =  $2\pi * r$**

Calculate the length of the outline of a circle.

Ex: radius = 7

$$c = 2\pi \times 7$$

$$c = 43.98$$

**14. Sine (SOH): Sine = opposite / hypotenuse**

A trigonometric identity that represents the relative sizes of the sides of a triangle and can be used to calculate unknown sides or angles of the triangle.

Ex: opposite = 2.8, hypotenuse = 4.9

$$s = 2.8 / 4.9$$

$$s = 0.57$$

**15. Cosine (CAH): Cosine = adjacent / hypotenuse**

A trigonometric identity that represents the relative sizes of the sides of a triangle and can be used to calculate unknown sides or angles of the triangle.

Ex: adjacent = 11, hypotenuse = 13

$$c = 11 / 13$$

$$c = 0.85$$



## 16. Tangent (TOA): Tangent = opposite / adjacent

A trigonometric identity that represents the relative sizes of the sides of a triangle and can be used to calculate unknown sides or angles of the triangle.

Ex: opposite = 15, adjacent = 8

$$t = 15 / 8$$

$$t = 1.87$$

## Time Management Strategies

### #1 Determine Now, Later, or Never

- Spending too much time on the hardest problems means you may rush through the easiest. Instead of working questions in order, ask yourself whether a question is a Do Now, Later, or Never.
- **NOW:** Does a question look okay? Do you know how to do it? Do it now.
- **LATER:** Will this question take a long time to work? Leave it and come back to it later. Circle the question number for easy reference.
- **NEVER:** Know the topics that are your worst, if you do not know where to begin, don't waste time on those questions. Instead, use more time to answer the Now and Later questions accurately.

### #2 Choose your "Letter of the Day"

- Just because you don't work a question doesn't mean you don't *answer it*.
- There is no penalty for wrong answers on the ACT, so you should never leave any blanks on your answer sheet.
- When you guess on "Never" questions, pick your favorite two-letter combo of answers and stick with it.
- For example, always choose A/F or C/H. If you're consistent, you're more likely to pick up points

### #3 Tackling Word Problems

- Word problems look a lot of different ways and test a lot of different math concepts, but if you keep these ACT math tips in mind, you should be able to get started on most word problems.
1. Know the question. Read the problem all the way through and underline the question.
  2. Let the answers help. Look for clues on how to solve.
  3. Break the problem into bite-sized pieces. Every problem has lots of information: Process each piece one at a time and be careful of tricky phrasing.

#### #4 Skip the Most Difficult Questions

- **Skip the Most Difficult Math Questions**

- There are 60 questions, if you answer at least 40 correct you will receive a score of 26
- The questions at the end of each section are the most difficult. This means that, for instance, **in the 20-question Math section, you should completely skip the last 4 questions.** Focus the energy you would have spent on those questions on getting the other 16 correct.

#### #5 Know Your Weaknesses

- **Find Your Math Weaknesses and Drill Them**

- As you take practice ACT exams, each time you miss a question identify the type of question it is.
- When you notice patterns to the questions you miss, you then need to practice the subskill.

#### #6 Understand Your Mistakes

- Every mistake you make on a test happens for a reason. **If you don't understand exactly WHY you missed that question, you will make that mistake over and over again.**
- On every practice test or question set that you take, mark every question that you're even 20% unsure about. When you grade the test or quiz, review each question you marked as unsure.
- In a notebook, write down the question, why you missed it, and how to avoid repeating that mistake.
- Organize questions you miss by subject and sub-topic to help you identify patterns.
- Conduct "Flashback" reviews of missed standards in order to get the answer correct the next time.

#### #7 Focus on Most Tested Skills

- 24 Math skills are tested, however, some are tested more than others
- Example: Numbers-rational numbers is **56 TIMES more likely to appear** than the least common skill (complex numbers).



### Most Common Math Skills Tested

Skill	Frequency	# of Q's
Numbers - Rational Numbers	11.97%	7
Algebra - Functions	8.76%	5
Algebra - Operations	8.55%	5
Numbers - Integers	7.26%	4
Algebra - Single Variable	6.84%	4
Plane Geometry - Triangles	6.41%	4
Plane Geometry - Polygons	6.41%	4
Coord. Geometry - Lines	5.56%	3
Plane Geometry - Circles	5.34%	3
Algebra - Word Problems	4.91%	3
Trigonometry	4.91%	3

### Least Common Math Skills Tested

Skill	Frequency	# of Q's
Coord. Geometry - Points	4.06%	2
Numbers - Statistics	3.85%	2
Numbers - Probability	3.21%	1
Algebra - Inequalities	2.35%	1
Plane Geometry - Lines and Angles	2.35%	1
Geometry - Solid Geometry	2.14%	1
Numbers - Sequences	1.92%	1
Algebra - Systems of Equations	0.85%	1
Coord. Geometry - Polynomials	0.85%	1
Coord. Geometry - Conic Sections	0.64%	1
Coord. Geometry - Reflections, Translations	0.43%	1
Algebra - Matrices	0.21%	1
Algebra - Complex Numbers	0.21%	1

## #8 Use the RISC Method on All Questions

1. Read the question
2. Information in the question- consider facts in the question and answer choice options
3. Solve: (4 Methods)
  - Backsolve
  - Pick Numbers
  - Translate Words into Math
  - Strategically Guess
4. Check to make sure that you answered the specific question that was asked, and plug in your final answer to the formula

### **Backsolve to save time on the ACT**

- You can backsolve when you see integers in the answer choices. Start with answer choice C/H unless the question asks for the smallest or largest value.
- Plug in the answers to solve the problem, until you land on the correct solutions.

### **Pick Numbers to avoid complicated Algebra on the ACT**

- Skip using involved algebraic equations by picking numbers for variables. Avoid picking 0 or 1 because they have special properties.

### **Translate Words into Math**

- Translate the words in the question into math so that you can solve more easily.
- When you see these words, you should use **ADDITION**:
  - Increased by
  - More than
  - Combined
  - Together
  - Total of
  - Sum
  - Plus
  - Added to
- When you see these words, use **SUBTRACTION**
  - Decreased by
  - Minus
  - Less
  - Difference
  - Between/of
  - Less than
  - Fewer than

- When you see these words, use **MULTIPLICATION**
  - Of
  - Times
  - Multiplied by
  - Product of
  - Increased/decreased by a factor (this type can involve both addition or subtraction *and* multiplication!)
- When you see these words, use **DIVISION**
  - Per, a
  - Out of
  - Ratio of
  - Quotient of
  - Percent (divide by 100)

### **Strategically Guess**

- Multiple-choice tests offer one great advantage: They provide the correct answer right there on the page!
- ACT hides the correct answer behind wrong ones, but when you cross off just one or two wrong answers, the correct answer can become more obvious

### **#9 Use Charts and Pictures to Answer**

- Some math problems are difficult to visualize, so sketching out a chart or picture of the given information can help you arrive at the correct answer when taking the math portion of the ACT. Here are some tips to keep in mind:
  - If you're a visual person, sketching will help you understand what is being asked.
  - Your sketch doesn't have to be perfect. Just seeing how the question looks on paper may help you out.
  - When you've got the beginnings of a sketch, step back from it and decide what kind of problem you're trying to solve. For example, do you need arithmetic, algebra, or geometry to solve it?

### **#10 Know Number Properties**

- Recognizing number properties will save you time on test day. Number properties rules include:
  - **Odds and evens**
  - **Prime numbers**
  - **Order of operations**

### **#11 Understand ACT Math Relationships**

- Know the difference between:
  - Values
  - Ratios
  - Percents

The ACT test makers place an importance on being able to move easily between percents, fractions, and decimals.

### **#11 Know Your Triangles**

- You must know the 30-60-90 and 45-45-90 rules.
- The ACT does not provide this information at the beginning of the math section, so be sure to memorize this information ahead of time.
- Also look out for Pythagorean triplets (3:4:5 and 5:12:13 and their multiples).

### **#12 Find Common Shapes**

- Find common shapes on the ACT to help you break complex figures into simple polygons. Look in particular for triangles!
- When the ACT does NOT mention “Note: Figure not drawn to scale,” you can use the figure to your advantage!

### **#13 Calculator Tips**

- **Make sure your calculator is allowed on Test Day!**
- May bring any 4-function, scientific, or graphing calculator as long as all formulas have been removed
- Sharing calculators during the test is not permitted, and the test proctor will not provide a calculator.
- Set up the problem on paper first. By doing this, you will prevent confusion and careless errors.
- Make sure your calculator has Fresh Batteries!

### **#14 Mark and Come Back**

- Mark the questions that you skip in your test booklet so that you can come back to them easily.
- Also, circle the answers that you choose so that you can check the answer grid against your booklet later on.
- When you take practice tests, try to practice bubbling in answers as well so that you can do it quickly and accurately on the real thing.

## #15 ACT Math Common Mistakes

### Recognize “Red Flags”

- Be on the lookout for common trap answers on the ACT. This includes oddball answers and answers that are too small or too big

### Do NOT Skip Steps

- ACT Math questions can be very sneaky. **Problems can appear at first glance to be deceptively easy.**
- ACT questions ask for you **to apply basic math knowledge in unique ways and often requires you to run through several steps** to get to the correct answer. **If you don't write out these steps, you can easily end up with the wrong answer.**

### ACT Math Common Mistakes

- **Not Understanding Functions**
  - **Functions tend to be one of the hardest concepts, if not the hardest concept, for most students.** Students are usually less familiar with algebraic and/or trigonometric functions than they are with other math concepts such as fractions and percentages.
  - To master the ACT, you must know your functions.
- **Solving for the Wrong Value**
  - ACT Math questions can be tricky because they ask you to apply basic skills in new ways but also because **they sometimes phrase questions in weird, complicated ways.**
  - Use your skills for converting words to symbols, and write down your steps to help you understand which value to solve for in each question.
- **Not Pacing Yourself**
  - With only 60 minutes to answer 60 questions, **you need to learn to pace yourself.** The questions progress from easy to hard, so no matter what score you're aiming for always attempt the questions chronologically.
  - **If you're aiming for a score higher than 30,** then you're going to need to answer all or almost all of the 60 questions. That means you must spend under 1 minute per question on the first 30 questions to save time for the harder end questions.
  - **If you're aiming for a score below 30,** then **you can afford to skip some questions.** For example, if you're aiming for 20, then you only need to get 32 math questions right. You can allow yourself a minute and a half per question, and you should attempt the first 40-45 questions and skip the hardest ones at the end.

*\*See Appendix for 16 Most Common Math Formulas Review Sheet*



## ACT SCIENCE STRATEGIES AND SOLUTIONS

### Science Content Knowledge:

- The ACT science test measures a student’s scientific reasoning abilities, such as **analysis**, **interpretation**, **evaluation**, and **problem-solving**.
- However, certain scientific knowledge is expected to be known in order to answer some of the questions.
- Basic content knowledge in biology, chemistry, physics, and earth science is recommended, advanced knowledge of the subject-specific content is not expected.
- Science Content on ACT
- **Biology**
  - Cell Biology
  - DNA, RNA, and Ribosomes
  - Natural Selection
- **Chemistry**
  - Basic Molecule Structure
  - Freezing/Boiling Point of Water in Celsius
  - pH Scale
  - Molar Mass Concepts
  - How Charges Interact
  - Phase Changes

### Subject: Biology

#### Topic #1: Cell Biology

- You need to know certain **cell organelles** (parts of cells), their functions, and whether they are found in animal or plant cells
- Scientific Content on ACT
- **Lysosomes** hold enzymes. Lysosomes digest food or break down the cell when it dies.
- **Mitochondria** are organelles that act like a digestive system, which takes in nutrients, breaks them down, and creates energy rich molecules (ATP) for the cell.
- The **cell nucleus** acts like the brain of the cell. It contains the cell's DNA, or the genetic information from which proteins are made. It also helps control eating, movement, and reproduction.

- **Chloroplasts** only exist in plant cells and assist in the process of photosynthesis, converting light into energy (which only plants do, not animals).
- The **cell membrane** holds all of the pieces of the cell and serves as the barrier between the cell and other cells.

#### **DNA, RNA, Ribosomes, and Protein Synthesis**

- DNA contains the genetic information needed for making proteins (protein synthesis). Protein synthesis involves DNA, RNA, ribosomes and proteins. **DNA acts as the blueprint for protein production.**
- **Messenger RNA (known as mRNA)** makes a copy of the sequence of DNA of a specific gene. This process is known as **transcription** and **happens in the nucleus.**
- Once the mRNA is made, it leaves the nucleus and enters the cytosol of the cell. **Ribosomes** use mRNA as a guide to make protein of the same amino acid sequence as the original DNA. The process of producing protein from the mRNA is referred to as **translation**. So, the process of protein synthesis consists of two steps: DNA to mRNA transcription and mRNA to protein translation.

#### **Natural Selection**

- Natural selection is also known as 'survival of the fittest.' In a specific environment, traits that allow organisms to reproduce more effectively will become more common, and traits that reduce reproductive success will become less common.

#### **Subject: Chemistry**

##### **Topic: Basic Molecule Structure**

- The ACT Science section expects you to know the basic molecular structure of **Sugar, Fat, Protein and Nucleic Acids.**
- **C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>** is the basic sugar molecule structure
- You only need to know that fats are made up of C (Carbon), H (Hydrogen), and O (Oxygen), and to differentiate fats from sugar, **fats have nearly twice the number of H as C and a very small number of O.**
- **Proteins are composed of amino acids.** There are many different protein structure, but **all proteins contain C, H, O and N (Nitrogen).**
- **Nucleic acids** are biomolecules. Two types of nucleic acids are **DNA and RNA.** Nucleic acids are made up of 3 parts: a 5-carbon sugar, a phosphate group, and a nitrogenous base. Nucleic acids are different from Sugar, Fat, and Proteins because they are made up of P (Phosphorus) and N in addition to C, H, and O.

##### **Topic: Freezing/Boiling Point of Water in Celsius**

- Water freezes at 0 degrees Celsius and boils at 100 degrees Celsius.

### Topic: pH Scale

- A pH scale is a measure of how acidic or basic a substance is. While the pH scale formally measures the activity of hydrogen ions in a substance or solution, it is typically approximated as the concentration of hydrogen ions.
- **All you need to know for ACT is that a pH of below 7 is acidic, above 7 is basic, and at 7 is considered neutral.**

### Topic: Molar Mass Concepts

- The only molar mass concept you need to know is that the **mass of a molecule is the sum of the mass of its atoms.**
- Scientific Content on ACT

### Topic: How Charges Interact

- Atoms are composed of three types of particles: **protons, electrons, and neutrons.** Protons are positively charged, electrons are negatively charged, and neutrons have no charge.
- **Like charges repel each other, while opposite charges attract each other.** For example, two positive charges will repel each other, while a positive and a negative charge will attract.
- Scientific Content on ACT

### Topic: Phase Changes

- Below freezing point, a material will be in solid form, just above freezing point a material will be in liquid form, above boiling point, liquid becomes gas (is vaporized).
- One natural way to think about this is in terms of water. When it's really cold, it turns to ice (solid). When it warms up, it turns to liquid. Then, when you boil it, it turns to steam (gas).
- Scientific Content on ACT

## Subject: Physics

### Topic: Gravity

- You need to know that **gravity is a downward force** that acts on objects, and other forces (such as a spring or pulley) can counteract gravity. This will come up a lot in passages that show experiments using springs or pulleys.
- Scientific Content on ACT

### Topic: Density Formula

- Density is the degree of compactness of a substance. To calculate the density of a substance, you use the formula:

- **Density = mass/volume**
- Scientific Content on ACT

### Topic: Density Rules

- **Denser objects sink, and less dense objects float.** Objects only float when they are less dense than the liquid they are placed in.
- An easy way to think about this: what happens when you throw a rock into water? It sinks - that's because the rock is denser than water, meaning it weighs more for the same volume.
- What about when you throw a Styrofoam cup onto water? It floats - because Styrofoam is less dense than water. For the same volume, Styrofoam weighs a lot less than water.

### ACT Science TEST Construction

#### Science Tip #1: Memorize the Directions:

- Read the passage carefully.
  - Refer to the scientific information in the passage when answering the question.
  - Read and consider all of the answer choices before you choose the one that best responds to the question.
  - Note conflicting viewpoints in some passages
- 
- The Science section has seven passages with a total of 40 questions to be answered in 35 minutes (Average 52 seconds per question.)
  - *You are **NOT** allowed to use your calculator on the science section. Yet, there are problems that require basic math skills*
  - As you practice for the Science section, attempt to complete the first 15 questions on the Math section without a calculator. The level of complexity of these questions will be similar to the math skills tested within the Science section.
  - Many students struggle with ACT Science because it is very fast and unlike any other science test they have every experienced.
  - The Science sections is the last section of the ACT, and many students report being tired from the 3+ hours of testing prior. Maintaining stamina is critical on this portion of the test.
  - **This section more than any other is about pacing and strategy.**
  - The seven passages will be presented in one of the following formats:
    - 3 Data Representation Passages
    - 3 Research Summaries
    - 1 Conflicting Viewpoints

- **Data Representation (30-40%)**  
This format includes graphics and tables for student analysis and interpretation. These questions measure a student’s ability to read graphs, interpret scatterplots, and interpret information presented in tables.
- **Research Summaries (45-55%)**  
This format includes descriptions of one or more related experiments. These questions measure the student’s ability to interpret experimental design and associated results.
- **Conflicting Viewpoints (15-20%)**  
This format presents alternative hypotheses expressed in response to incomplete data or differing views. These questions measure the student’s ability to understand, analyze, and compare inconsistent viewpoints or hypotheses.
- For passage topics, ACT pulls content from biology, chemistry, physics, and the Earth/space sciences such as **astronomy, geology, and meteorology.**
- Most of the questions can be answered from the information presented in the passages or figures, but be prepared for 3 to 4 questions that require outside scientific knowledge on each section.
- You need to be able to:
  - **look up data and trends**
  - **make predictions**
  - **synthesize information**
- **Passage Type 1: Data Representation Passages**
  - These passages are similar to those found in science journals and text.
  - They present you with a short paragraph or two as well as one to four visual representations of data (such as graphs, tables, and/or scatterplots).
  - The passages will mention specific studies and label sections as “Study 1/2/3.”
- **Question Type 1: Factual Questions**
- These questions simply ask you to relay factual information that is presented in the passage.
- To answer these questions, you need to read the graphs, tables, and/or scatterplots.
- You need to pull out specific data points without further calculation/inferences.
- **Question Type 2: Interpreting Trends Questions**
- Trends questions ask you to evaluate graphs, tables, and/or scatterplots to decide if there is a **relationship.**
  - Is it increasing or decreasing?
  - Is there an inverse relationship or direct relationship?

- **Question Type 3: Calculations Questions**

- These questions ask you to take what is given and figure out where it is going. Given the data, what might Y be at value X?
- The questions ask you to make **extrapolations** (to infer, or make a projection from known data) and **interpolations** (estimate a value between two values).

### **Extrapolations**

- Calculate data that is beyond the bounds of what we're given.

### **5 step process to answer extrapolation questions:**

1. Pinpoint what we're figuring out, is it a value more or less than what we are given?
2. Identify the relationship between 2 consecutive data points in the table or graph. How much does the y-value increase or decrease as the x-value increases?
3. Find the relationship between the data in the question and the data in the table. For example, is the data in the question 5 more or less than the data in the table?
4. Apply the pattern in the table to the new data point.
5. Find the closest (or hopefully matching) answer.

### **Interpolations**

- Calculations of numbers between known data points. Use three step process on all Interpolation questions:
  1. Find the relevant data (two data points equidistant from the point in question).
  2. Average the data together to find the approximate value for the midpoint.
  3. Find the closest (or hopefully matching) answer.

### **Calculating Questions: Math Meets Science**

- ACT Science questions that require calculations will only require very simple math that you can do by hand or in your head.
- Calculation questions require you to find a specific value based on the figures provided. However, the value will not be shown in the figure.
- Using the information you are given, you will need to predict what would happen past the edges of the graph or between values on a table.

### **Passage Type 2: Research Summaries Passages**

- These passages look similar to the Data Representation Passages in that they usually present you with a short paragraph or two plus visuals (graphs, tables, scatterplots, or images)

- The difference is that **Research Summaries Passages focus on a specific experiment or a couple of experiments.**
- The passages will usually label sections as Experiment 1/2/3 and mention a scientist or student who is conducting the experiment. There may be an image of how the experiments are set up.

#### **Question Type 4: Experimental Design/Researcher Intent Questions**

- These questions ask you to determine why the researcher designed the experiment a certain way.
- What are the controls and variables in the experiment?
- What is the hypotheses on which the experiment is based?

#### **Question Type 5: Hypothetical Experimental Questions**

- These questions ask you to determine what would happen if there was a change in the experiment (in the temperature, solution, etc.)
- They often require you to understand the trend of the data to predict how the outcome would change if the experiment were changed.

#### **Question Type 6: Interpreting Experiments Questions**

- These questions ask you interpret the information that you are given. Based on the data shown, is this statement supported?
- These questions are often framed in a 2x2 matrix:
  - Yes because A
  - Yes because B
  - No because A
  - No because B

#### **Passage Type 3: Conflicting Viewpoints Passage**

- This passage is the most different. The passage presents you with two short essays (and looks similar to an English passage).
- The essays represent conflicting scientific viewpoints or theories.
- It is very important that you figure out the difference in opinion between the two writers. Sometimes the difference will be subtle and not completely opposite.

#### **Question Type 7: Understanding of Viewpoints Questions**

- These questions check to make sure you understand each author's point of view. What would researcher X predict to happen?

#### **Question Type 8: Comparing Viewpoints Questions**

- These questions ask you to point out the similarities and differences between the authors.

## ACT SCIENCE TIPS AND STRATEGIES

### Conflicting Viewpoints

- The Conflicting Viewpoints Passage has no graphs or tables.
- The questions ask you about each viewpoint and the differences and similarities between the viewpoints.
- **You need to read and understand the entire passage to answer the questions.** Therefore, this passage will take the longest, so **save it for last, so it doesn't slow down your pace.**

#### You should ask yourself these questions while you read:

1. What does scientist/student 1 believe?
2. What does scientist/student 2 believe? What does scientist/student 3/4/5 believe?  
(Occasionally, there will be more than 2 viewpoints represented. There have been as many as 5 viewpoints discussed on a Conflicting Viewpoints Passage.)
3. How is scientist/student 2's point of view different from scientist/student 1's point of view?
4. How is scientist/student 2's point of view similar to scientist/student 1's point of view?

### Science Strategies: Use Visuals

- **If a passage has visuals, go straight to the questions without reading. Try to answer all of the questions using only the visuals.**
  - Many students get bogged down in reading the science passage. There are dozens of data points to consider, and most of them won't have any questions about them. So you'll end up wasting time trying to understand data that really aren't important.
- **Sometimes, this method of answering questions will require a little inference / deduction skills, so it may not work for everyone on every question.**
- Determine Now, Later, or Never
- Spending too much time on the hardest problems means you may rush through the easiest. Instead of working questions in order, ask yourself whether a question is a Do Now, Later, or Never.
- **NOW:** Does a question look okay? Do you know how to do it? Do it now.
- **LATER:** Will this question take a long time to work? Leave it and come back to it later. Circle the question number for easy reference.



- **NEVER:** Know the topics that are your worst, if you do not know where to begin, don't waste time on those questions. Instead, use more time to answer the Now and Later questions accurately.

#### **Science Strategies: Know When to Skip**

- Keep track of your timing. **You should not spend more than 1.5 minutes on any question.** Ideally, you should be spending exactly 52.5 seconds on each question. However, some questions you'll be able to answer faster, so it'll allow you to spend a little more time on harder problems.
- **Use process of elimination.** Try to get rid of all the answer choices you know are wrong. Then, pick your favorite answer choice among what is left over. Even if you're not 100% sure, bubble it in, and put a small star or circle next to it so you can go back to it if you have time.

#### **Science Strategies: Strengths/Weaknesses**

- **Figure out which types of passages you excel at and which you need work on.**
- The different types of passages need very different approaches, and you may have particular strengths and weaknesses.
- **Math/Science** minded students often need practice on **Conflicting Viewpoints.**
- **English/Reading** minded students often need more practice on **Data Representation** and **Research Summaries**

#### **Science Strategies: Avoid Getting Stuck**

- **For the Math thinker,** you sometimes get stuck in the numbers and lose sight of the main point. Don't recalculate all of the data or get lost in numerical details.
- Focus on the main ideas of the passage. If you get frustrated obsessing over numbers and then realizing you didn't need them to answer the question, you are getting stuck.
- **Try to refocus your attention by looking at the questions first, figuring out exactly what you need to answer the question, and then going back and looking for only that information.**
- **For the English thinker,** you might get stuck and overwhelmed by the visuals, numbers, or big science terms.
- Don't panic over the numbers. Write your own notes in the margins to help you stay focused.
- **For the Science thinker,** don't get stuck in dissecting the experiment or research or the science terms.
- Do not overthink the passage content.
- If you find yourself trying to fully understand the experiment and then realizing you didn't need to (which you shouldn't), you are getting stuck.

- **Focus on the questions asked, read the questions first, and don't read the whole passage unless absolutely necessary to answer the questions**

#### **Science Strategies: Understand your Mistakes**

- For every question you make a mistake on, focus on understanding why you made that mistake.
- You might have misread a graph accidentally, or you interpreted an experiment incorrectly. Examine why you made the mistake to improve your chances of not making the mistake next time!

#### **Understand All the Parts**

- **Reading Graphs and Other Visuals Is the Key to Success on the ACT Science Section**
- **Labels are VERY IMPORTANT on the ACT Science section.**
  - Each visual is labeled with Figure plus a number. So if there are 3 visuals, they will be labeled Figure 1, Figure 2, and Figure 3.
  - Each visual is labeled so you will refer to the correct one. The question will often specifically tell you which figure to look at.
  - **The first step in most ACT Science questions is to read the label, and if you get this step wrong, you will get the answer wrong.** So make sure you check the label to ensure you are looking at the correct visual for the question.

#### **Science Strategies: Axes**

- Axes are the lines at the side(s) and bottom of a graph.
- **Axes are useful to figure out the control and the variable(s) in the experiment.**
- Graphs by definition have an x-axis and y-axis.
- The x-axis is the horizontal line (typically at the bottom of the graph).
- The y-axis is the vertical line (typically on the left side of the graph, though more challenging graphs on the ACT Science will have one on the left and one on the right).
- Science Strategies: Units of Measure
- On graphs on the ACT Science section, they will present units of measure for each axis next to the label. **Don't try to understand what the units mean.**
- The ACT Science section throws in units that you won't have seen unless you studied very high-level Physics or Chemistry. You do not need to know exactly what they refer to in order to answer the questions.
- **For the ACT Science section, when the units are listed in the answer choice, they match up to the units shown in one of the visuals or mentioned in the passage.** So, there is no need to dwell on them or stress over them.

### Science Strategies: Unit Conversion

- ACT Science question will **NOT** ask you to convert the units from one form of measure to another.

### Science Strategies: Types of Graphs

#### Bar Graph

- Bar graphs tend to be one of the easier visuals used by the ACT Science section. **Bar graphs are really easy, so long as you make sure you have identified the correct bar, you will find the data you need.**

#### Scatter Plot

- Scatterplots are graphs of plotted points that show the relationship between two sets of data.
- **Try whenever possible to draw out the curve on the graph you are given and then use process of elimination.**

#### Line Graphs

- Line graphs are one of the harder types of visuals used in the ACT Science section. **The reason they are more difficult is that they show essentially an infinite number of data points, and you need to be precise about which data point you're looking at.** There are so many values since each point on the line is a new value.
- Also, **the ACT Science section often uses line graphs to show 2 entirely different sets of data, one on the left and one on the right with a key to differentiate between the two lines.**

#### Tables

- Tables are one of the easier types of visuals provided.
- There are a number of columns, and each entry in a column corresponds to the entry directly to the right or left of that entry in the same row.
  1. **Identify the correct column in question**
  2. **Find the correct data point in question**
  3. **Look to the right or left of it in the same row to find the matching data point**
- Some tables on the ACT Science section will have many rows and columns of data, but the technique is always the same.

### Science Strategies: Practice Variety

- There may be more advanced versions of questions in which you are asked to look at an unusual graphs.

- It is imperative to practice with a wide variety of graphs in all subject matters in order to be adequately prepared for the Science section of the ACT.
- Examples of type of questions asked on the ACT Science section
  - What’s being shown?
  - What are the trends?
  - What is unusual?
  - Summarize each experiment.
  - What variable was changed?
  - Make note of any changes to the data in tables, charts, graphs

### Time Management Tips

- Leave yourself **1 minute to 30 seconds** at the end of the section to bubble in a letter for the ones you could not get to or skipped. **DO NOT leave any blanks.**
- There is no penalty for guessing on the ACT, so if you leave blanks, you are giving up free points. Every 1-2 questions answered raises your score 1 point especially in the 30-36 range.
- Choose your “Letter of the Day” and select that option for all unanswered questions. All letters are used randomly and equally. For example, always choose A/F or C/H. If you’re consistent, you’re more likely to pick up points

### GENERAL ACT TEST TAKING TIPS

- **Memorize the directions.** During the test, you won’t get extra time to read the directions, so if you take five minutes to figure out what to do, that’s five fewer minutes you’ll have to get points.
- **Don’t doodle.** On the answer sheet, that is. The ACT is graded by a machine; if your doodling interferes with the reading mechanism, you could miss out on points. Keep the oval sheet as clean as is possible.
- **Erase completely.** Bring two erasers – one for the heavy-duty erasing you may need to do and another clean eraser to fix up your ovals completely. You don’t want to lose points because of eraser marks.
- **Pace yourself.** On some test sections, you’ll have a little less than 30 seconds to answer each question, so keep that in mind. Don’t spend three minutes staring off into space or re-reading a longer passage; stay focused.
- **Bring a watch.** You won’t be able to have your cell phone on you, so bring a watch. At the beginning of each section, reset your watch to 12:00 then memorize how much time you have for each section
- **Reconsider the obvious.** If an answer seems too easy, it may just be. Be sure to read every answer choice and select the best possible answer. The obvious choice may be a distracter.

- **Don't second-guess.** If you marked B for question 18, there was probably a good reason for it, so don't go back and change it, unless you've found information in a later part of the test to disprove your original theory. Statistics prove that your first guess is usually the best one.
- **Look for "Extremes" and "Opposites."** Look for extreme words in answers like "never" or "always." Words like that will often disqualify an answer choice because they eliminate so many correct statements.
- **Watch out for opposites, too.** A test writer will often put the exact opposite of the correct answer as one of your choices, using very similar wording to test your ability to read carefully.
- **Come back to a "tough" question.** If you're stuck between two answer choices, circle the question in your book and come back to it with fresh eyes after you've answered the other questions. Remember you have to pace yourself.
- **Mark up your test:** make notes in the margins that identify paragraph/passage content, mark key words or topics.
- **Cross-check ovals.** Every five questions or so, double-check your answer sheet to make sure you haven't skipped an oval. There's nothing worse than getting to the end of a test and realizing you missed filling in an oval somewhere and have to erase everything!
- **Beware the "Obvious" Answer or "Trap" Answer**
- **Don't RUSH!** The ACT can be a stressful situation that causes you to rush at times. Which is normal. But what this does sometimes is cause you to rush into getting answers.
- **Be careful if an answer comes too easily.** If a problem or question looks too easy, it probably is! Beware. Make sure you think again about all the possible answers. Don't be fooled by the "lure choice," which is often times Choice A. But at the same time, you must realize that Choice A can at times be the correct answer.
- **Bring your own calculator.** The test center will not provide you with one, so bring an approved calculator for easier math work.
- **Pick a "Letter of the Day"**- If you are running out of time, or have completed the Process of Elimination and are still unsure, choose one letter and utilize that same letter throughout the entire test.
- **Practice, Practice, Practice**-You've heard it before, but it's really the truth. Buy an ACT prep book, and answer every single question in it. You'll gain confidence and a lot of extra points by doing so. ***\*40 hours of effective study time typically equals 3 point gain-act.org***

- **Consider the “NO CHANGE” option:** Consider the "NO CHANGE" option every time you evaluate a question. Historically, the ACT test-takers have included between 15 – 18 questions that *are correct just as they are in the text*. If you never choose the "NO CHANGE" option, then there's a good chance you're getting the answer wrong! **Think about it every single time, and rule out the other answer choices if you can.**
- **Misjudging Paragraphs:** Commonly, students misjudged where the paragraphs start and end which will cause them to miss points on questions that refer to a specific paragraph if they leave out a sentence or two.
- **The Solution:** Pay close attention to indentations that indicate the next paragraph has started. The best way to avoid this issue altogether is to go through the text and draw a line in between paragraphs (for the passages that aren't marked already).
- **“Letter of the Day”:** Have a pre-specified “Letter of the Day” like (A)/ (F) or (B)/ (G) to fill in automatically so you don’t use extra time deciding which answer choice you want.