

## **Astronomy Units of Study**

### Unit 1 - Astronomy Basics

- 1.1 - History of Astronomy
- 1.2 - Basic Concepts in Astronomy
- 1.3 - Earth-Sun Relationship

### Unit 2 - Telescopes and the Motion of Celestial Bodies

- 2.1 – Telescopes
- 2.2 - Celestial Spheres and Constellations
- 2.3 - Motion of the Stars and Planets

### Unit 3 – Satellites

- 3.1 - Artificial Satellites
- 3.2 - Lunar orbit (phases, eclipses, and tides)
- 3.3 - Lunar surface features and origin

### Unit 4 - The Sun & Stars

- 4.1 - Energy formation and layers of the Sun
- 4.2 - Spectral Class & Spectral Analysis
- 4.3 - Life Cycle & HR Diagram

### Unit 5 - Galaxies & Exoplanets

- 5.1 - Galaxies
- 5.2 - Expansion of the Universe
- 5.3 – Exoplanets, Space Travel

### Unit 6 - Our Solar System

- 6.1 – Planets
- 6.2 - Dwarf planets and other solar system bodies
- 6.3 - Solar System and Planet Projects

## Units Used in Astronomy

NAME OF UNIT	SYMBOL OR ABBREVIATION	DESCRIPTION AND METRIC (SI) EQUIVALENT UNITS
angstrom	Å	Measure of the wavelength of light. 1 Å = $10^{-10}$ m or $10^{-8}$ cm
astronomical unit	AU	Average Earth-Sun distance. 1 AU = $92.95582 \times 10^6$ mi 1 AU = $1.495979 \times 10^{11}$ m
light-year	ly	Distance that light travels in one year. 1 ly = $6.3240 \times 10^4$ AU 1 ly = $5.9 \times 10^{12}$ mi 1 ly = $9.46053 \times 10^{15}$ m
parsec	pc	1 pc = 3.261633 ly 1 pc = 206,265 AU 1 pc = $3.085678 \times 10^{16}$ m
kiloparsec	kpc	1,000 pc
megaparsec	Mpc	1,000,000 pc

## Constants

Quantity	Value
astronomical unit (A.U.)	149,597,870.691 kilometers
light year (ly)	$9.460536207 \times 10^{12}$ km or 63,240 A.U.
parsec (pc)	$3.08567802 \times 10^{13}$ km or 206,265 A.U.
sidereal year	365.2564 days
Earth mass	$5.9736 \times 10^{24}$ kilograms
Sun mass	$1.9891 \times 10^{30}$ kg = 332,980 × Earth
mean Earth radius	6371 kilometers
Sun radius	$6.96265 \times 10^5$ km = 109 × Earth
Sun luminosity	$3.827 \times 10^{26}$ watts
speed of light (c)	299,792.458 kilometers/second
gravitational constant (G)	$6.6726 \times 10^{-11}$ m <sup>3</sup> /(kg sec <sup>2</sup> )

## Good Listening in Class

It is important for you to be a good listener in class. Much of what you will have to learn will be presented verbally by your teachers. Just hearing what your teachers say is not the same as listening to what they say. Listening is a cognitive act that requires you to pay attention and think about and mentally process what you hear.

Here are some things you should do to be a good listener in class.



- **Be Cognitively Ready to Listen When You Come to Class.** Make sure you complete all assigned work and readings. Review your notes from previous class sessions. Think about what you know about the topic that will be covered in class that day.
  - **Be Emotionally Ready to Listen When You Come to Class.** Your attitude is important. Make a conscious choice to find the topic useful and interesting. Be committed to learning all that you can.
  - **Listen with a Purpose.** Identify what you expect and hope to learn from the class session. Listen for these things as your teacher talks.
  - **Listen with an Open Mind.** Be receptive to what your teacher says. It is good to question what is said as long as you remain open to points of view other than your own.
- 
- **Be Attentive.** Focus on what your teacher is saying. Try not to daydream and let your mind wander to other things. It helps to sit in the front and center of the class, and to maintain eye contact with your teacher.
  - **Be an Active Listener.** You can think faster than your teacher can speak. Use this to your advantage by evaluating what is being said and trying to anticipate what will be said next. Take good written notes about what your teacher says. While you can think faster than your teacher can speak, you cannot write faster than your teacher can speak. Taking notes requires you to make decisions about what to write, and you have to be an active listener to do this.
  - **Meet the Challenge.** Don't give up and stop listening when you find the information being presented difficult to understand. Listen even more carefully at these times and work hard to understand what is being said. Don't be reluctant to ask questions.
  - **Triumph Over the Environment.** The classroom may too noisy, too hot, too cold, too bright, or too dark. Don't give in to these inconveniences. Stay focused on the big picture - LEARNING.



## Note Taking Tips

- **Pay Attention.** If you are daydreaming, doodling, eating, sleeping, talking or doing work from another class, etc....you will miss what you need to know because you will miss what's being said.
- **Watch the teacher.** If the teacher writes something down on the board, repeats what was said more than once, or directly says that what is being said should be written down.....then write it down!
- **Listen carefully.** Write down key words, ideas and definitions that are being talked about or mentioned during class.
- **Ask questions.** If you miss something that is said, or didn't get it all written down, ask the teacher to repeat it. You can always compare notes with a friend after-class, after-school or at lunch, to be sure you got everything down that was important.
- **Stay organized.** Use a separate binder or folder for each class. Keep all of your notes and papers in there. Do not put or keep papers or notes in your books. Put them into the binder or folder at the end of class.

## Test Taking Tips

- **Read directions carefully.**
- **Read through all choices on multiple choice questions and eliminate unreasonable choices.**
- **Go through and answer the questions you know, skip those you don't know and come back to them.**
- **Don't let the "big" words scare you - circle and replace them with a word you know.**
- **On short answer questions- go back and make sure you answered all parts of the question when you are finished.**
- **If you see a reading passage, read the questions for that passage before you actually read the passage.**
- **Check your work**
- **Skim over the test to make sure you answered all of the questions.**

## Managing Your Study Time

There are only so many hours in a day, a week, and a term. You cannot change the number of hours, but you can decide how to best use them. To be successful in school, you must carefully manage your study time. Here is a strategy for doing this.

### Prepare a Term Calendar

At the beginning of a term, prepare a Term Calendar. Update it as the term goes on. Here is what to do to prepare a Term Calendar.

- Record your school assignments with their due dates and your scheduled tests. Record your planned school activities.
- Record your planned school activities.
- Record your known out-of-school activities.



### Prepare a Weekly Schedule

Each Sunday before a school week, prepare a Weekly Schedule. Update it as the week goes on. Here is what to do to prepare a Weekly Schedule.

- Record your daily classes.
- Enter things to be done for the coming week from your Term Calendar.
- Review your class notes from the previous week to see if you need to add any school activities.
- Add any out-of-school activities in which you will be involved during the week.
- Be sure to include times for completing assignments, working on projects, and studying for tests. These times may be during the school day, right after school, evenings, and weekends.

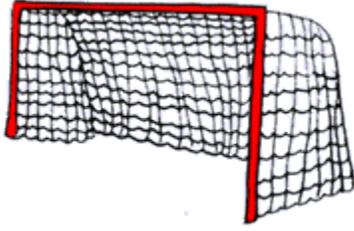
### Prepare a Daily Organizer

Each evening before a school day, prepare a Daily Organizer for the next day. Place a  $\checkmark$  next to each thing to do as you accomplish it. Here is what to do to prepare a Daily Organizer.

- Enter the things to do for the coming day from your Weekly Schedule.
- Enter the things that still need to be accomplished from your Daily Organizer from the previous day.
- Review your class notes for the day just completed to see if you need to add any school activities.
- Add any out-of-school activities in which you will be involved the next day.

Your Weekly Schedule should have more detail than your Term Calendar. Your Daily Organizer should have more detail than your Weekly Schedule. Using a Term Calendar, a Weekly Schedule, and a Daily Organizer will help you make the best use of your time.

## Setting Goals



A *goal* is something you want to achieve. A *short-term goal* is something you want to achieve soon. Examples of short-term goals are finishing your homework and doing well on tomorrow's test. A *long-term goal* is something you want to achieve at some later date. Examples of long-term goals are writing a paper and passing a class.

To set appropriate goals, you must know what is important for you to accomplish. Then you must set specific and clearly stated goals. If you do not have clearly stated goals, your effort will lack direction and focus. Write your goals to have a record of them.

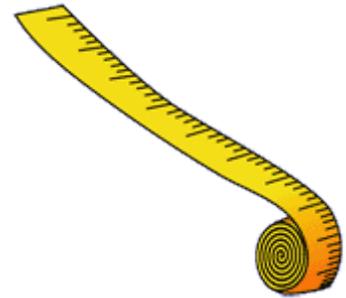
### THE THREE W'S OF GOALS

Each goal you set should state **WHAT** you will do and **WHEN** you will accomplish it. Implied in each goal you set is your **WILL** (determination) to do it. For example, a goal for a research paper might be stated as follows: *I will* (your determination) *finish gathering information for my research paper* (what you will do) *by November 20* (when you will accomplish it).

### CHARACTERISTICS OF APPROPRIATE GOALS

Your goals should be:

1. ***within your skills and abilities***. Knowing your strengths and weaknesses will help you set goals you can accomplish.
2. ***realistic***. Setting a goal to learn the spelling of three new words a day is realistic. Trying to learn the spelling of fifty new words a day is not realistic.
3. ***flexible***. Sometimes things will not go the way you anticipate and you may need to change your goal. Stay flexible so when you realize a change is necessary you will be ready to make the change.
4. ***measurable***. It is important to be able to measure your progress toward a goal. It is especially important to recognize when you have accomplished your goal and need to go no further. Failure to measure your progress toward a goal and recognize its accomplishment will result in effort that is misdirected and wasted.
5. ***within your control***. Other than when working as part of a group, accomplishment of your goal should not depend on other students. You can control what you do, but you have little or no control over what others do. You may do what you have to do, but if others don't, you will not accomplish your goal.



Many times your *parents*, *teachers*, and *counselors* will set goals for you. Be accepting when they do. These are people who know what is important for you and are very concerned with your success. They can also help you accomplish the goals they set.

**SET GOALS IN SCHOOL THAT PROVIDE YOU WITH DIRECTION AND LEAD TO SUCCESS.**

## The Ten Study Habits of Successful Students

Successful students have good study habits. They apply these habits to all of their classes. Read about each study habit. Work to develop any study habit you do not have.

Successful students:

1. **Try not to do too much studying at one time.** If you try to do too much studying at one time, you will tire and your studying will not be very effective. Space the work you have to do over shorter periods of time. Taking short breaks will restore your mental energy.
2. **Plan specific times for studying.** Study time is any time you are doing something related to schoolwork. It can be completing assigned reading, working on a paper or project, or studying for a test. Schedule specific times throughout the week for your study time and keep these as part of your daily routine, just like sleeping and eating. When a scheduled study time comes up during the day, you will be mentally prepared to begin studying.
3. **Find a quiet area.** Go somewhere well lit, quiet and free of distractions. Do not study on your bed; you will probably end up falling asleep. Turn your cell phone off. Put the video game controller down. Turn your TV off. Turn the radio off. Sit in a comfortable chair at a desk or table. Get out your book(s), notes, study guides, note cards, etc. Be sure to let people know that this is your study time so they don't interrupt (or call) you.
4. **Set specific goals for your study times.** Goals will help you stay focused and monitor your progress. Simply sitting down to study has little value. You must be very clear about what you want to accomplish during your study times. Be sure to work on assignments you find the hardest first! Your most difficult assignment will require the most effort. Start with your most difficult assignment since this is when you have the most mental energy.
5. **Call another student when you have difficulty with an assignment.** This is a case where "two heads may be better than one."
6. **Study your notes and past work.** Hopefully you've been taking thorough notes during class. Get your notes out and read them. Re-read them, and then read them again. It may help to even read them aloud to yourself. The more you see it and hear it, the easier it will be to remember it. Have family and friends quiz you. Pay particular attention to knowing and understanding the vocabulary terms. It may help to also make flashcards, two column notes, or by rewriting your notes in your own words- do what works for you! Be sure to look over old assignments and quizzes (if available).
7. **Focus on the main ideas.** Read and review the main ideas and concepts first, then move onto the details (dates, times, definitions, etc). By really understanding and knowing the main ideas first, it will make knowing the specific details easier.
8. **Set time aside to study on the weekend.** Yes, weekends should be fun time. But there is also time to do some review. This will help you be ready to go on Monday morning when another school week begins.
9. **Don't cram.** Cramming for a test doesn't work. If you try and review too much at once, you will end up forgetting most of it. Study and review 20-30 minutes every day to make it easier for yourself.
10. **Do what works for you.** These are just basic tips. Try different methods until you find a way that works best for you. **Think positive and remember to relax and breathe! Relax.**

