

# Stargazers

Science is a field that is always changing. Knowledge grows. How? New ideas build upon old. Things that scientists did decades ago form the basis for today's understandings. Two female astronomers helped to change what we know about stars and galaxies. One was Annie Jump Cannon. The other was Henrietta Swan Leavitt.

Annie Jump Cannon was born in 1863. The Civil War was raging. At that time, few women attended high school. Almost none went to college. Annie's mother loved to stargaze. She taught her daughter all that she knew about the stars. Annie liked to learn. She wanted to know more. Her teachers got her parents to send her to college. While she was there, she had an ear infection. It left her hearing impaired. There were no hearing aids back then. She had to learn to read lips.

Annie graduated. She went to work. She got a job in the Harvard College **Observatory**. She was hired because she was good at noticing details. Her job was hard. For 25 cents an hour, she studied glass photographic plates. The plates were full of stars. These star photos were taken by combining cameras and telescopes. The pictures showed the light each star made. Annie studied the pictures. She looked at the same ones each day. Were they getting brighter? Were they dimmer? Were they in the same spot? Then, Annie had to classify the stars. She found that the old classification method didn't work. So she came up with a new one. Her star classification system is still used today. Between 1915 and 1924, she wrote nine volumes of the *Henry Draper Catalog*. It is a book. Astrophysicists still use it today. Annie worked until she was seventy-seven years old. She catalogued more than 350,000 stars. She also found five novas. Novas are stars that suddenly become very bright and then fade. In 1931, she won an award. It was the Draper Medal from the National Academy of Sciences.



Annie was one of a team of women. They all worked to catalog the stars. Henrietta Swan Leavitt was another stargazer. She worked in the same place. She was deaf, too. Henrietta made the Harvard Standard scale in 1913. It was used to measure a star's brightness. Henrietta was interested in variable stars. These stars changed in brightness. Each one followed a cycle, like a schedule. She tracked each star over time. She found 2,400 variable stars. Today, we know that there are more than 24,000.

Henrietta figured out why the variable stars had cycles. It was based on how far away they were. She came up with the Period-Luminosity Law in 1908. This law lets scientists measure where stars lie beyond the Milky Way Galaxy. For the first time, people knew for sure that there were stars outside our own galaxy. Later, the astronomer Edwin Hubble used this law. He proved there are stars and whole galaxies beyond our own.

Henrietta died in 1921. Annie lived until 1941.



# Stargazers

**Directions: Darken the best answer choice.**

1. Who proved that there are galaxies besides the Milky Way?

- (A) Annie Jump Cannon
- (B) Edwin Hubble
- (C) Henrietta Swan Leavitt
- (D) Henry Draper

2. An **observatory** is a place where

- (A) astronomers study the solar system.
- (B) college students earn degrees.
- (C) astronomers can travel to planets.
- (D) college students go to study for exams.

3. Which event occurred last?

- (A) Henrietta stated the Period-Luminosity Law.
- (B) Henrietta created the Harvard Standard scale.
- (C) Annie produced the first of a nine-volume star catalog.
- (D) Annie won the Draper Medal from the National Academy of Sciences.

4. Variable stars change

- (A) into novas.
- (B) in position.
- (C) in brightness.
- (D) in color.

5. What is the first name of the astronomer for whom the Hubble Telescope is named?

- (A) Annie
- (B) Edwin
- (C) Henry
- (D) Henrietta

6. Picture Annie and Henrietta at work in the Harvard College Observatory. What *don't* you see in their work area?

- (A) photographic plates
- (B) cameras
- (C) telescopes
- (D) computers

# son Academic Words—History

Academic Vocabulary

**agriculture** *n.* farming.

**archaeological** *adj.* having to do with the remains of ancient human life. [Greek: the root *archaeo*, from *arkhaio*, ancient, and the suffixes *-logy*, study of, *-ic*, like, and *-al*, relating to.]

**architecture** *n.* the art and science of designing and creating buildings; the style of buildings.

**commerce** *n.* the buying and selling of goods; business and trade.

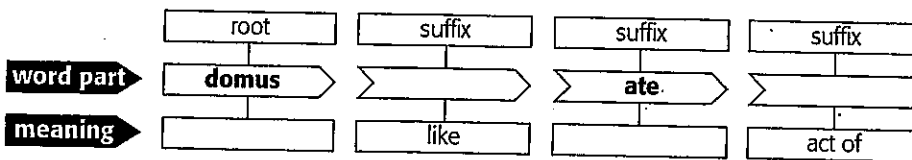
**community** *n.* a group of people living in the same place or with common or similar interests.

**culture** *n.* human activities and thought such as art, literature, religion, and politics.

**domestication** *n.* training animals or plants to be useful to humans. [Latin: root *domus*, home, and the suffixes *-ic*, like, *-ate*, to cause, and *-ion*, act of.]

**metallurgy** *n.* the study of the properties and uses of metals.

## Break It Down—domestication



**A.** Match each word with its definition. Write the letter of the matching word in the blank.

- |   |                   |
|---|-------------------|
| ___ 1. a group of people living together                    | A. archaeological |
| ___ 2. the art and science of building                      | B. architecture   |
| ___ 3. the study of metals                                  | C. commerce       |
| ___ 4. the buying and selling of goods                      | D. community      |
| ___ 5. having to do with the study of ancient human objects | E. metallurgy     |

**B.** Write the letter of the word or phrase that best completes each sentence.

- \_\_\_ 1. You would expect someone interested in **architecture** to study  
a) animals.   b) farming.   c) buildings.
- \_\_\_ 2. People in a **community** are  
a) far apart.   b) connected to each other.   c) old.
- \_\_\_ 3. The **domestication** of animals involves  
a) taming and training them.   b) painting them.   c) acting like them.
- \_\_\_ 4. The **culture** of a group of people includes its  
a) mountains, rivers, and lakes.   b) weather.   c) art, science, and government.

# Academic Words—History

**caste** *n.* a social class, especially in Hindu society.

**civic** *adj.* having to do with a city or its citizens. [Latin: word *civicus*, from *civis*, citizen.]

**economy** *n.* the system dealing with the activity of money, materials, and labor.

**ethical** *adj.* relating to right behavior; good values. [Greek: root *ethos*, character, and the suffixes *-ic*, like, and *-al*, relating to.]

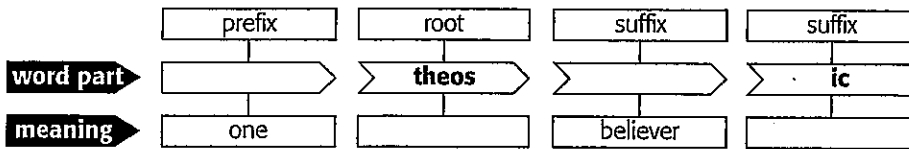
**monotheistic** *adj.* believing that there is one god. [Greek: prefix *mono-*, one, the root *theos*, god, and the suffixes *-ist*, one who believes, and *-ic*, like.]

**mythology** *n.* the collection of stories a culture tells to explain its origin, history, gods, and heroes; folk tales and legends. [Greek: root *muthos*, story, and suffix *-logy*, study of.]

**philosophy** *n.* the study of what people believe and how they should act; a system of values that a person decides to live by.

**social** *adj.* related to living together in groups; having to do with humans and the ways they decide to organize.

## Break It Down—monotheistic



**A.** Write the letter of the vocabulary word that best completes each sentence.

- |  |  |
|--|--|
| <p>____ 1. Animals that live together in groups are _____ beings.<br/>a) monotheistic b) social c) civic</p> <p>____ 2. _____ is the study of ancient stories about the world.<br/>a) Economy b) Philosophy c) Mythology</p> <p>____ 3. If you want to learn about a country's money and materials, study its _____.<br/>a) mythology. b) caste. c) economy.</p> <p>____ 4. People who believe in one god are _____.<br/>a) monotheistic. b) ethical. c) social.</p> | <p>____ 5. Ideas that deal with right behavior are _____.<br/>a) civic. b) social. c) ethical.</p> <p>____ 6. The study of how people know and should act is _____.<br/>a) mythology. b) philosophy. c) economy.</p> <p>____ 7. Matters that have to do with a city and its residents are _____.<br/>a) ethical. b) civic. c) monotheistic.</p> <p>____ 8. A person's class in society is his or her _____.<br/>a) economy. b) philosophy. c) caste.</p> |
|--|--|

**B.** Read the paragraph first. Then fill in each blank with the correct vocabulary word.

*ethical    philosophy    monotheistic    social*

Some people think that \_\_\_\_\_ is an important subject to study because it deals with human knowledge and action. One branch of that field has to do with right, or \_\_\_\_\_ behavior. People can find answers there for many \_\_\_\_\_ problems of living in a community. This is true if the people are \_\_\_\_\_, or if they believe in many gods or in no god at all.

**3 Academic Words—History**

*Academic Vocabulary*

**citizen** *n.* a person living in a country, state, or city who is entitled to its rights and subject to its laws.

**democratic** *adj.* characterized by government by the people; the decisions for the country are made through the people's right to voting of some type.

**dictatorship** *n.* a government under the rule of a single leader or group of people; a system run by an all-powerful leader. [Latin: root *dictare*, to say, and the suffixes

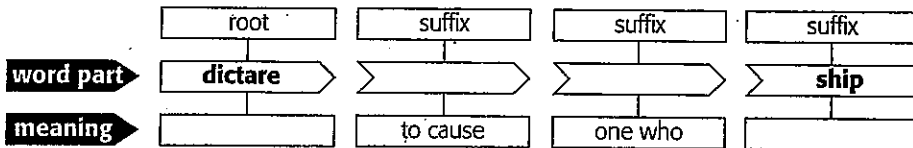
*-ate*, to cause, *-or*, one who, and *-ship*, condition of.]

**justice** *n.* fairness; upholding laws.

**political** *adj.* having to do with the matters of government or the state.

**republic** *n.* a country or state that is usually ruled by a president in modern times and whose citizens vote for its lawmakers; a form of government where the people have representation. (Latin: prefix *re-*, to give, and root *publica*, of the people.)

**Break It Down—dictatorship**



**A.** Match each word with its definition. Write the letter of the matching word in the blank.

- a. *citizen*    b. *democratic*    c. *dictatorship*    d. *justice*    e. *political*    f. *republic*

- |  |  |
|--|--|
| ___ 1. characterized by government by the people   | ___ 4. a country usually ruled by a president with participation by citizens |
| ___ 2. having to do with the affairs of government | ___ 5. the resident of a country or state                                    |
| ___ 3. fairness                                    | ___ 6. a government under the rule of an all-powerful person                 |

**B.** Write the letter of the word or phrase that best completes each sentence.

- |   |   |
|---|---|
| ___ 1. If you were interested in <b>political</b> matters, you might study about<br>a) literature.<br>b) government and laws.<br>c) medicine.                   | ___ 4. If you lived in a <b>dictatorship</b> , you probably<br>a) wouldn't be able to vote for the leader of your choice.<br>b) would have an easy life.<br>c) would have all the freedom you wanted. |
| ___ 2. People living in a <b>democratic</b> country have<br>a) no more than one child.<br>b) a king or queen.<br>c) the right to vote.                          | ___ 5. Being a <b>citizen</b> of a country entitles you to<br>a) a computer.<br>b) protection under its laws.<br>c) a birth certificate.  |
| ___ 3. Treating other people with <b>justice</b> means<br>a) being fair.<br>b) making them wait in line.<br>c) making them get a license before they can drive. | ___ 6. People living in a <b>republic</b> have<br>a) a religious leader.<br>b) a king.<br>c) representation in their country's government.  |

# Academic Words—History

Academic Vocabulary

**ago** *adv., adj.* gone by; past; meaning in the past.

**century** *n.* one hundred years. [Latin: root *centum*, hundred; and the suffix *-ry*, collection of.]

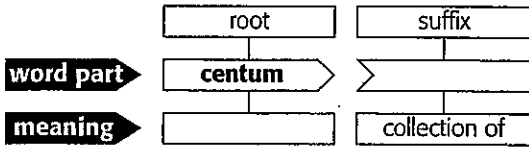
**era** *n.* a particular time from one date to another; historical age.

**fall** *v.* to drop down; descend.

**period** *n.* an interval of time; term.

**rise** *v.* to move up; ascend.

## Break It Down—century



**A.** Match each word with its synonym. Write the letter of the matching word in the blank.

- |                           |             |
|---------------------------|-------------|
| _____ 1. historical age   | A. ago      |
| _____ 2. ascend           | B. century. |
| _____ 3. 100 years        | C. era      |
| _____ 4. past             | D. fall     |
| _____ 5. interval of time | E. period   |
| _____ 6. descend          | F. rise     |

**B.** Fill in each blank in the paragraph with the correct vocabulary word.

*ago*    *century*    *era*

*fall*    *period*    *rise*

In history, we study events that happened years \_\_\_\_\_. The \_\_\_\_\_ between the years 1800 and 1900, for example, is very interesting to study. This interval of time is also called the 19th \_\_\_\_\_. People who lived in this \_\_\_\_\_ saw industry \_\_\_\_\_, or become more successful. As a result, these people also saw farming \_\_\_\_\_, or decline.