

## JAF03 Lesson 8 Cause and Effect

The process of seeking relationships among scientific facts includes looking for cause and effect. The fifth-century B.C. Greek philosopher Leucippus suggested that there is causality in nature, that is, that every natural event has a natural cause. All science is based on this assumption. Scientists must be careful, however, not to assume that one event caused another just because they happened in sequence.

**I. In each of the following sentences identify the cause and the effect.**

1. When copper is heated to 1083°C, it melts.
2. The rotation of a compass needle is due to the earth's magnetic field.
3. Acids turn litmus paper red.
4. Fast-moving charged particles induce the ionisation of atoms.
5. The ocean's tides are caused by the gravitational pull of the moon.
6. The more iron is exposed to moist air, the more it rusts.
7. Colour is produced by the reflection of light.

**II. Consider the phrases below and their possible cause-effect relationships. You may use the phrases from the table below.**

1. Drinking alcohol – being depressed
2. Wearing hats – going bald
3. Subscribing to a left-wing newspaper – having left-wing political opinions
4. Being optimistic – being successful

	<i>results in</i>	
A mixing of all wavelengths	<i>causes</i>	a white light.
	<i>produces</i>	
	<i>induces</i>	
	<i>caused by</i>	
White light is	<i>due to</i>	a mixing of wavelengths.
	<i>induced by</i>	
	<i>a result of</i>	
	<i>produced by</i>	
	<i>if</i>	
A white light is produced	<i>when</i>	all the wavelengths are mixed.
	<i>as</i>	
<i>Note: Some of the predictions can also be expressed with the future tense, e.g. "If all the wavelengths are mixed, a white light will be produced."</i>		

**III. Understanding paraphrases.**

**Circle the letter of the answer that best matches the meaning of each of these sentences.**

1. Increasing the temperature increases the rate of a chemical reaction.
  - a) Chemical reactions cause an increase in temperature.
  - b) An increase in the rate of a chemical reaction may be caused by increasing the temperature.
2. Ions are formed when an acid is dissolved in water.
  - a) Ions cause an acid to be dissolved in water.
  - b) Dissolving an acid in water causes ions to be formed.
3. The closer the lines of force, the stronger the electric field.
  - a) When the lines of force are closer, the electric field is stronger.
  - b) The lines of force cause the electric field to be stronger.
4. Mirages are caused by light rays bending in the air.
  - a) Mirages are a result of light rays bending in the air.
  - b) Mirages cause light rays to bend in the air.

**IV. Complete the sentences:**

1. If a butterfly flaps its wings, .....
2. As a uranium atom is split, .....
3. Your child will be intelligent if .....
4. If an apple falls to the ground, .....
5. .... you will make a remarkable discovery.

**V. Using subordination**

**In each of the following examples, combine the two clauses into one sentence so that one idea is subordinate to the other. You will need to add a connecting word such as *when, if, as, or because*.**

1. Effect: no sound can be heard; cause: a bell is struck in a vacuum
2. Cause: chlorophyll disintegrates; effect: leaves turn red, yellow, and orange
3. Effect: an echo is heard; cause: a sound wave reflects off a mountain
4. Effect: ions are formed; cause: an acid is dissolved in water
5. Cause: a lens is too thin or an eyeball is too short; effect: a person becomes farsighted

**VI. Reading**

**THE NATURE OF COLOUR**

**Complete the blanks with suitable words:**

Why is the sky blue and the grass green? What we see as colour is the way our brains respond to the different wavelengths of light.

Light is a form of electromagnetic energy that travels very quickly on different frequencies, or wavelengths, which we see as different colours. For example, a wavelength of 400 nanometres (nm) \_\_\_\_\_ us to see violet. A wavelength of 660 nm \_\_\_\_\_ us to see red. The colour brown is \_\_\_\_\_ by the mixing of wavelengths. Our sky looks blue \_\_\_\_\_ molecules of oxygen and nitrogen in the air scatter more blue wavelengths than any other colour.

White light is \_\_\_\_\_ a mixing of wavelengths of all colours. Sir Isaac Newton discovered that when sunlight passed through a glass prism, the white light dispersed into a spectrum of coloured light. Newton then allowed the spectrum to pass through a second prism and the colours recombined, \_\_\_\_\_ a beam of white light. This simple experiment demonstrated that white light contains all the colours of the spectrum. A beautiful and dramatic example of this occurs \_\_\_\_\_ sunlight falls on drops of water in the air after a rain. The beam of white sunlight spatters into a rainbow of colours.

(exercises I, III, V, VI adapted from Zimmerman, F. *English for Science*. Prentice Hall Regents, 1989.)

## VII. Phrasal verbs – cause and effect

**Complete the blanks with particles.**

1. The new airport has brought \_\_\_\_\_ a lot of changes on the island.
2. I think most of the problems teenagers experience spring \_\_\_\_\_ a feeling of insecurity.
3. The film sparked \_\_\_\_\_ a lively discussion in the class.
4. Nuts can trigger \_\_\_\_\_ a violent allergic reaction.
5. The wind stirred \_\_\_\_\_ a lot of dust.
6. I don't know what lies \_\_\_\_\_ their strange reaction.
7. I accidentally set \_\_\_\_\_ the alarm when I came home.

## VIII. Discussion points

1. What are some of the beneficial/ adverse effects of the technological advances in science on our lives?
2. What causes men and women to travel into space?
3. What are some of the effects of space exploration?
4. What are the possible effects of a continued expansion of world population?
5. What are the effects of a computer on your life?

## IX. Video – Science of stress

### 1. Before you listen:

**What are the major causes of stress in general/ for yourself?**

**Check the vocabulary:** *to take the toll on sth., rush hour, to boost, to utilize, to deplete, to gauge, treadmill, to kick in, high gear, vital, to soar, diabetes, to handle, a dose*

### 2. Watch the video and note down:

<http://video.nationalgeographic.com/video/science/health-human-body-sci/human-body/science-stress-sci/>

- What are the main types of stress?
- What do they cause?
- How can we prevent stress-related diseases?
- Is stress always negative?