

# UNIT 9 GUIDE

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# Unit 9—Acceleration

**Unit 9 Driving Question:** To what extent has the Modern Revolution been a positive or a negative force?

## Learning Outcomes

1. Describe accelerating global change and the factors that describe it.
2. Understand the key features that define the Anthropocene.
3. Describe how economies have developed and changed since the Industrial Revolution.

## Key Concepts

Between 1500 and 1900 CE, the world became globally connected and rates of innovation grew faster than ever before. In this unit, students examine how the changes of recent centuries have led humans across a new threshold of complexity and generated entirely new types of societies, possibilities, and challenges. Human power over the biosphere has increased so rapidly that one scientist argues that we have entered a new era in the Earth's history, the Anthropocene, or the era dominated by humans.

### Acceleration

In the last 500 years, the pace of change has accelerated dramatically. This acceleration has driven four main types of change:

- The creation of the first global exchange networks
- The discovery of huge new sources of energy as a result of the fossil fuels revolution
- Technological and organizational innovation
- A sudden increase in the military, economic, and technological power of the societies affected first by these changes

While the pace of acceleration was dramatic in the first 400 years of this era, this acceleration became even faster in the twentieth century. A major source of evidence for this acceleration is statistics, which provide important evidence of the scale and pace of change.

### The Anthropocene and Impacts on the Biosphere

Modern technologies have increased our collective power over the biosphere at an astonishing rate. As humans and human domesticates (including livestock and pets) use an increasing share of the Earth's energy and resources, less is available for other species, so rates of extinction are rising and approaching those seen during some of the major extinction events of the past 600 million years. Through building, irrigation, and deforestation, humans are transforming landscapes, reducing the availability of fresh water, and undermining the fertility of soil in many regions. Nuclear weapons threaten virtually instant destruction, while the burning of fossil fuels is increasing carbon dioxide levels in the atmosphere and threatening the relatively benign climates that allowed human civilizations to thrive in recent millennia. The huge increase in human ecological power has persuaded some that in the last century or two, the Earth has entered a new era in its history – the Anthropocene.



## Changing Economies

The connection of the four world zones allowed for the creation of a global network of exchange. Though this network was not built overnight, it emerged fairly quickly, and it increased the potential connections and diversity of connections for many members of the network, accelerating both collective learning and innovation. Commerce was an important driver of change in this global network. Because commerce began to take on greater significance for many societies, a number of important thinkers began to ask questions about the nature of the exchange of goods, the nature of productivity and efficiency, and the interests of the individual and the state in business, which gave birth to the discipline of economics. These economic thinkers shared a set of concerns and questions but often came up with very different answers to those questions. The articulation of the ideas of capitalism and communism were the most influential economic ideas generated in the course of the Modern Revolution.

## Why This Matters

Understanding why and how human populations began to grow like never before and the effect of that growth on the biosphere is important to understanding our world today. Population growth and innovation led to more established societies, and although this is often highly beneficial to humans, there are also negative impacts that need to be understood. While having more stability is beneficial to humans, it's not necessarily beneficial to Earth. Today's world is so complex and its technologies so powerful that the impacts of each are unpredictable. Without the historical knowledge of how we arrived where we are today, and the scientific knowledge to carefully measure the impacts of humans on the planet, we will move into the future somewhat blindly. Global changes and the emergence of new societal structures have massive consequences for our future – the more we understand about these, the better prepared we will be to move forward in a positive direction.

## Misconceptions and Teaching Challenges

### Pros and Cons of Industrialization

Students may not realize that there were both benefits and drawbacks to industrialization. In order for students to begin to grasp these effects, they might brainstorm the pros and cons of industrialization. This can be done in small groups or as a class, with you writing the students' ideas on the board. Statistics—presented in the form of lists, charts, and graphs—are an important part of the evidence presented in Unit 9. It's quite easy to focus on country averages and lose sight of what important changes meant for the individual. For example, while England may have increased textile or steel production in a given period, which resulted in dramatic economic growth for the country overall, this growth would probably have been experienced very unevenly by individuals. The power and wealth that can come from an acceleration of innovation or economic growth will not usually be spread evenly among a country's people.

### Types of Governments and Their Impacts

Students might have trouble making connections between the acceleration of innovation and how this contributed to new forms of government. It will probably be helpful to provide students with some more detailed information about the different types of governments — monarchy, democracy, socialism, communism — and how new innovations in the Industrial Revolution led to imperialism, which in turn led to a number of revolutions in which people demanded greater rights and freedoms from their governments.



## Understanding Economics

The article “Smith, Marx, and Keynes” can be difficult to understand when students have limited prior knowledge of economics. This article focuses on the ideas of three of the most influential thinkers of modern economics. For students who have never been asked to think about the key ideas of economics before, this new way of thinking might prove challenging. If further explanation is needed, a mini-lesson on the basics of economics — commerce, supply and demand, and the role of government — may be necessary.

## Vocabulary

**Anthropocene epoch** — A new epoch, not formally accepted by geologists, during which our species has become the dominant force for change in the biosphere. The Anthropocene marks the end of the Holocene epoch, about the time of the Industrial Revolution, 200 years ago.

**artisan** — A person who is skilled at a craft such as pottery or weaving.

**biosphere** — The entire network of life on Earth; the region of Earth in which living organisms can be found.

**capitalism** — A competitive economic system in which products and production means are owned by individuals or private groups.

**climate change** — Measurable changes in the climate over long periods of time.

**collective learning** — The ability to share, preserve, and build upon ideas over time.

**commerce** — The large-scale buying and selling of goods and services.

**communications** — The technologies, including speech, writing, printing, and the Internet, by which people exchange information and ideas.

**communism** — A system of government or social organization in which all property is held collectively and authorities control the distribution of property and resources. For a time in the twentieth century, communist societies in the Soviet Union, China, Eastern Europe, and East and Southeast Asia included almost half of the world’s population.

**competitive market** — A system of exchange of goods and services based on supply and demand.

**energy** — The capacity to do work, associated with matter and radiation. Includes kinetic energy, potential energy, and chemical energy, among others.

**exchange networks** — Networks that link people, societies, and regions through the transfer of information, goods, people, and sometimes disease. All forms of collective learning work through exchange networks.

**fossil fuel** — A carbon-based material such as coal, oil, or natural gas that can be used as an energy source. Fossil fuels were originally formed when the remains of living organisms were buried and broken down by intense heat and pressure over millions of years.

**globalization** — The expansion of exchange networks until they begin to reach across the entire world.

**industrialization** — The transition to mechanized or more technologically advanced production methods, such as factories.

**Industrial Revolution** — A period of technological innovation starting in England late in the eighteenth century that resulted in a major change in the way goods were produced, and caused a major shift in global economics. These innovations came as a result of the systematic use of fossil fuels in place of human and animal power to manufacturing, communications, and transportation.

**innovation** — Generation of a new idea, method, or product.

**Marxism** — Ideologies inspired by the writings of Karl Marx (1818–1883). Marx argued that capitalism was the key feature of the modern world, but that capitalism created such profound inequality that it would eventually have to be abolished in a future socialist society.

**Modern Revolution** — A deliberately vague label for the revolutionary transformations that have created the modern world. The Modern Revolution began around 1500 and ushered in the Modern era of human history.

**monopoly** — A situation in which there is only one supplier of a commodity. According to economic theory, monopolies stifle innovation because monopolists have a captive market so they do not need to worry about improving the quality or reducing the price of their products.

**steam engines** — Machines that burn coal to produce steam, used to perform mechanical work. James Watt configured the first profitable one at the time of the American Revolution. Their use launched human society over a threshold no longer limited by the annual flow of solar energy.

**transportation** — The technologies and methods by which people and goods are moved from place to place. Methods of transportation include porters, horse-drawn wagons, cars, trains, boats, planes, and shipping containers, among many others.

## Lesson and Content Overview

Lesson name	Lesson description	Content	Activity
9.0—Acceleration	In the last 500 years, our world has undergone a transformation. Connecting the four world zones fostered astounding innovation and shoved our species into the Modern era.	<ul style="list-style-type: none"> <li>• Watch: Threshold 8 – The Modern Revolution</li> <li>• Watch: Crash Course World History: The Industrial Revolution</li> <li>• Read: “The Industrial Revolution”</li> <li>• Watch: How Did Change Accelerate?</li> <li>• Read: “Acceleration”</li> </ul>	<ul style="list-style-type: none"> <li>• Opening: The Appetite for Energy</li> <li>• Activity: DQ Notebook</li> <li>• Vocab Activity: Memorization</li> <li>• Closing: Is Change Accelerating? Debate</li> </ul>
9.1—The Anthropocene	Communication, transportation, and greater connection — the pace of innovation continued to accelerate, stimulating a tremendous appetite for energy. For the first time, a single species can effect major change on the entire biosphere.	<ul style="list-style-type: none"> <li>• Watch: How Was the Modern World Created?</li> <li>• Read: “The Anthropocene”</li> <li>• Watch: Welcome to the Anthropocene</li> </ul>	<ul style="list-style-type: none"> <li>• Vocab Activity: Comprehension</li> <li>• Activity: Population Growth</li> <li>• Closing: The Impact of Population Growth Essay</li> </ul>

Lesson name	Lesson description	Content	Activity
<b>9.2—Changing Economies</b>	Smith, Marx, and Keynes — acceleration gave rise to three dynamic thinkers who had great influence on the ideas of commerce, labor, and the global economy.	<ul style="list-style-type: none"> <li>• Read: “Collective Learning” (Part 4)</li> <li>• Watch: The Big History of Everything – H2</li> <li>• Read: “Smith, Marx, and Keynes”</li> </ul>	<ul style="list-style-type: none"> <li>• Opening: DQ Notebook</li> <li>• Activity: This Threshold Today</li> <li>• Closing: Investigation 9</li> </ul>
<b>Investigation: To what extent has the Modern Revolution been a positive or a negative force?</b>	The investigation in this unit takes a closer look at Threshold 8 and explores how changes occurring as part of the Modern Revolution have impacted human life.	<ul style="list-style-type: none"> <li>• Population trends</li> <li>• Literacy</li> <li>• Inventions and discoveries</li> <li>• Wars</li> <li>• Climate change</li> </ul>	<ul style="list-style-type: none"> <li>• Worksheets</li> <li>• A four- to five-paragraph essay that will be used as a writing assessment.</li> </ul>
<b>Additional content</b>	Additional content items, including image galleries, can be used to augment lessons or customize your own unit.	<ul style="list-style-type: none"> <li>• The Modern World (gallery)</li> <li>• Chemistry and Energy (video)</li> <li>• Energy Through Time (reading)</li> <li>• Learning tips</li> <li>• Random facts</li> <li>• Related galleries, images, websites, and videos</li> <li>• Web links</li> </ul>	
<b>Assessments</b>	Unit 9 includes a required Investigation Writing assessment, the last of three such assessments in the course.	<ul style="list-style-type: none"> <li>• Investigation</li> <li>• Unit Quiz (optional)</li> </ul>	<ul style="list-style-type: none"> <li>• Glossary Challenge</li> </ul>
<b>Actions</b>	The Unit Log is required for every unit.	<ul style="list-style-type: none"> <li>• Unit Log</li> </ul>	

