Chapter 14 Section 5 The Scientific Revolution

Astronomy – the Universe

Until the mid 1500s people accepted the theories of the Greek astronomer Ptolemy that the Earth was the center of the universe – matches the teaching of the church…..but during the Renaissance

1543 Nicolaus Copernicus proposed a heliocentric universe – with the sun at the center. The earth was just another planet among several planets. – this conflicts with the classic view and with the church’s dogma about the structure of the Universe – if Ptolemy was wrong what else was wrong – so most of the “experts” rejected this theory.

Yet scientists go on proving it to be true with careful observations over time – Tyco Brahe, then Johannes Kepler track the planets over time and show them to move in an elliptical pattern. Gallileo built on the work of the others by creating an astronomical telescope – found the four largest moons of Jupiter in orbit around that planet – just like Copernicus said Earth moved around the sun.

The church tries G before the Inquisition in 1633 and threatened him with death if he didn’t retract his heresies about a moving earth, and state publicly that the earth was the motionless center of the universe. He did, and spent the rest of his life under house arrest. His dying words were said to be “And yet, it moves.”

The Scientific Method emerges during the 1600s as a way to collect and measure data in a more accurate format…..

identify problem🡪 gather info🡪hypothesis 🡪 conduct tests, measure data🡪analyze data 🡪 reach a conclusion, and repeat to confirm results.

Francis Bacon and Rene Descartes reject Aristotle’s scientific assumptions and believe that the truth is what you find after you investigate, not something that can be stated based on religious belief or philosophy.

Bacon believed in experimentation and observation 🡪 practical technologies

Descartes believed that human reasoning was the best road to understand the world better, that doubt led to new knowledge through thinking the problem through.

His famous statement “I think, therefore I am” illustrates his dedication to man as a thinking entity. The mind and body co-exist but do not interact – we are the ghost in the machine.

Newton – and Gravity

Isaac Newton developed his theories about gravity while sitting under an apple tree as a student, and watching an apple fall to the ground. He extrapolated that the same force that pulled the apple down might control the movements of bodies in space, all of space, like planets.

He works on his theory for 20 years – calls his force “gravity” and finally proves his theory through the use of mathematics.

Nature follows uniform laws, so all motion in the universe can be measured and described through mathematical formulas. Newton had other interests too, and his alos considered the father of Calculus.

Chemistry and medicine also flourish –

Chemistry moves away from medieval alchemy toward the study of elements we know today. Modern analysis stems from the work of Robert Boyle in the 1600s.

Medicine – studies of human cadavers by artists and scientists brought new knowledge to medicine, and new developments like better salves and ointments, new surgical techniques (stitches) meant survival rates improved. the invention of the microscope by van Leeuwenhoek and the discovery of the circulation of blood all helped understand the body and ways to heal its ills better.

Chapter 18 sec 1 Philosophy in the Age of Reason

Scientific revolution influences other areas of thought. If reason can solve science – why not social issues?

Study human behavior, reason out the best solution for social, government etc. issues

Hobbes v. Locke

Hobbes – 1588 to 1679

Leviathan

People are cruel, greedy and selfish

need to be controlled to overcome their basic nature

“state of nature” – no laws or government – means life is “solitary, poor, nasty, brutish and short”

to overcome this – social contract is formed, man surrenders the state of nature in exchange for an orderly society

Ideal government = absolute monarchy to compel order and obedience to laws.

Locke – 1632 to 1704

Second Treatise of Government

People begin life as a tabla rasa – a blank slate, and are generally reasonable, moral. People have natural rights – rights they have from birth, to life, liberty and property.

Governments are formed to protect these rights. Ideal govt = limited power, accepted by all citizens – a government has an obligation to the people it governs. If that government fails to meet its obligations or violates people’s natural rights the people have the right to overthrow that government. This “right to revolution” is the basis for a lot of what happens next.

Montesquieu – 1689 to 1755

Critical of absolute monarchy

liked limited monarchy of Britain

government = executive, legislative, judicial powers

says separation of powers was the best way to protect liberty, each branch check and balance on the other two.

Thinkers like this were called Philosophes – or lovers of wisdom

Voltaire – uses wit to expose the abuses of the day – government, church, society everyone was a target of Voltaire, but especially corrupt officials and idle aristocrats. He battled inequality, injustice and superstition –

He was imprisoned, his books were outlawed and burned, he was forced into exile but he never stopped defending his right to freedom of speech…..

Denis Diderot’s Encyclopedia took 25 years to produce. his 28 volume work was designed to not only inform but to change the way the world thought by explaining the new ideas of the time on government, philosophy, religion. – Montesquieu and Voltaire were contributors. Writers denounced slavery, supported freedom of expression and education for everyone regardless of gender or class. They attacked the divine right theory and traditional religions. The work was called an attack on public morals, and the pope threatened anyone who bought or read the book with excommunication.

Despite this 20,000 copies were printed and distributed between 1751 and 1789 and it was translated into many languages besides French – the Encyclopedia spread the ideas of the Enlightenment across Europe and to the Americas.

Rousseau – 1712 to 1778 the most controversial philosophe

from the lower classes, never adjusted to the elite. strange and brooding. not exactly a sparkling representative for his thoughts like Voltaire or the others

“Man is born free, and everywhere he is in chains.”

Rousseau believes people in their natural state were basically good.

this natural innocence is corrupted by society’s evils, in particular the unequal distribution of property.

*The Social Contract*  -- the natural man must surrender freedom to enter into society, but society should not take away anymore freedom than is absolutely necessary to support the best possible community for the whole. Society of his time places too many limitations on people’s behavior, and therefore does not serve the needs of its citizens.

controls are necessary but should be minimal

AND control should only be in the hands of freely elected governments – since governments get their power from the surrender of freedom by the people, the people should have a say in who is in charge and what that government looks like.

the “general will” or conscience of the people will naturally seek the good of the community as a whole – and that good should be placed above individual interests. The individual’s needs and wants need to be subordinate to the good of the whole.

Hot stuff – gets the masses thinking about their place in the world, and how it can be changed.

Womens – want a piece of the action. The men shoot them down. This equal and free stuff is only for guys since women should be raising babies. Mary Wollstonecraft disagrees – writes *A Vindication of the Rights of Women* (1792)– women must decide what is in their own best interests, and not be dependent on their husbands. Education is the key, and boys and girls should receive equal education.

Adam Smith – *Wealth of Nations* (1776)

physiocrats – concerned with merchantilism, where govts control the flow of trade – believe that a *laissez faire* or open approach to markets was the best. Adam Smith’s theory the “invisible hand” would guide the markets, through supply and demand, and profit will drive society’s producers.

No government in the marketplace – but should protect society, administer justice and provide public works. Smith’s ideas drive the economic growth of the 1800s and 1900s.

sec. 2 Enlightenment Ideas Spread p.451

Paris is the heart of the Enlightenment – draws intellectuals, and is a center of discussion and talk of reforms ran through the population like wildfire – and across Europe and beyond.

Even absolute monarchs toyed a little with the new ideas. For some the radical rethinking of traditional beliefs and customs through the lens of reason was frightening and threatened their way of life, or their thrones.

New Ideas Challenge the status quo –

Information is more freely available – pamphlets, books, easily produced, widely distributed

The old divine right model for government is under attack – the church and governments try to censor new ideas by restricting access, or threatening punishments – books are burned, writers are jailed.

To avoid prison – use fiction to disguise their criticisms – Candide – Voltaire (1759), Persian Letters, Montesquieu

Salons – gatherings of thinkers and their fans in the homes of wealthy usually noblewomen at first, then middle-class folks become involved. Ideas are exchanged on an equal basis by people of all classes.

Monarchs – intrigued by the new thinking the heads of Europe engage in the discussion through letters with great thinkers, and inviting them to their courts.

Frederick the great lures Voltaire to Prussia to found an academie of science….Frederick did a lot of public policy work when not fighting – draining swamps, distributing tools and seeds and introducing new crops for peasants to grow. Religious tolerance – “In my kingdom everyone can go to heaven in his own fashion” – aimed to make the Prussian government more efficient with better laws, and a reorganized bureaucracy – a stronger government meant a stronger monarchy – just like he liked it…

Catherine the Great – wrote to Voltaire and Diderot .. loved Voltaire as a champion of mankind – an enemy to superstition, fanaticism ignorance and trickery. Limited reforms early in her reign in law and government, but in the end did nothing to jeopardize her own power and authority.

Joseph II (son of Maria Theresa) – went out among his people in disguise to learn about the lives of the peasants and middle class. Religious tolerance, ended censorship, tried to bring the Catholic church under control – sold monasteries and convents to build hospitals, abolished serfdom – only lasted until he died, then most of his reforms were taken away.

Art: Baroque and Rococo for the fancy people. Plainer and more realistic art for the middle classes. – Rembrandt. – ordinary people portrayed with dignity.

Music: