

SMU Cox

Bridwell Institute for Economic Freedom

LESSON PLAN TO ACCOMPANY
THE BRIDWELL INSTITUTE ECONOMIC
FREEDOM VIDEO SERIES

CREATIVE DESTRUCTION



[Watch Series](https://www.youtube.com/playlist?list=PL97qxLfk4drqry3HselsA5gwiJQi8t9Mt)

<https://www.youtube.com/playlist?list=PL97qxLfk4drqry3HselsA5gwiJQi8t9Mt>

FAQs for Teachers

How should this curriculum be used?

The modules can be taught individually or in sequence in whatever order the educator prefers. The educator can always use this guide and the materials that are available on: <https://www.smu.edu/cox/centers-institutes/bridwell-institute/video-series>

What grade level?

The modules are designed for 8-12 grade implementation.

Do I need written permission to use the lessons?

The use of these lessons and materials in a classroom setting for any educational purpose is allowed.

How do I get started?

We recommend giving a complete read through this manual first, then watch the referenced video series.

Technology Requirements?

If you are planning to project the videos to students, we recommend a large screen set up with a projector or a large monitor for students to be able to see from any portion of the room.

How much time per lesson?

Each unit is designed for 90 minutes of classroom interaction with students. It can be taught over 90 minutes with a small break (block schedule) or over two consecutive days with 45 minutes of instruction each (traditional schedule).

Does the lesson align with state curriculum standards?

These lesson plans, materials and activities should align with any state's standards. Please contact us for assistance if required.

How can we contact you?

Contact us directly at the Bridwell Institute for Economic Freedom at bridwell-institute@smu.edu

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CREATIVE DESTRUCTION

SUGGESTED CLASSROOM PROCEDURES

- Show students all videos as time allows
- Review summary below
- Conduct active learning exercises, as appropriate
 - PAST INNOVATION
 - HORSE POWER TO HORSEPOWER DEMONSTRATION
 - HEIRARCHY OF HUMAN TALENTS

For additional classroom-specific materials like quizzes, tests, classroom exercises, and other ancillaries, please email bridwell-institute@smu.edu.

IMPORTANT QUESTIONS TO ANSWER

- What is the economic process that delivers progress in market economies?
- What determines the path of economic progress?
- What is the main reason for job losses and business failures in America?
- How do the human talents and skills needed in the workforce change over time?

SUMMARY OF CREATIVE DESTRUCTION LESSON

This module focuses on two fundamental and interrelated aspects of America's free-enterprise system—first, how it delivers material progress and, second, why jobs and companies routinely disappear. A process of “creative destruction” — out with the old and in with the new—unites progress and job losses. Over time, economies that accept job losses will see greater economic progress. The module will feature activities that will show teachers how to engage students in exploring how innovation and new technology impact living standards and jobs.

BACKGROUND READING

CREATIVE DESTRUCTION: A PARADOX OF PROGRESS

Creative destruction, a paradox of progress, is the process in capitalist systems that delivers higher living standards for most people while creating economic upheavals that hurt some industries, companies and workers. To be specific, the economic progress that we celebrate goes hand-in-hand with the job losses, bankruptcies, and the diminished prospects that leave some people worse off in the short and medium term. Policies to alleviate or avoid the pain may save jobs and existing companies in the short term, but they will fail in the long run. New industries and jobs will be stunted, overall progress will slow, and living standards will stagnate and eventually decline. A properly functioning capitalist economy routinely creates and destroys jobs as it delivers economic progress. Accepting job losses is how economies move labor and other resources to companies and industries that better meet the needs and wants of consumers.

Human beings are by nature inquisitive and creative, seeking better ways to meet consumers' needs and wants, but economic progress was glacially slow for most of human history. In societies with little innovation, living standards didn't change much from one generation to the next. Jobs lasted generations—passed on from parents to children. Over the past two centuries or so, first the Industrial Revolution and then the Information Age have accelerated the pace of technological change, particularly in the United States and other capitalist countries. The surge in technology has raised incomes and living standards dramatically and changed the nature of work. Indeed, the world has seen more economic progress in the past 200 years than it had in all previous recorded history. According to Angus Maddison's data, global per capita GDP rose from \$467 in Year 1 to \$666 in 1820; since then, it has jumped nearly 10-fold to about \$6,000.

Innovation languished until the development and spread of economic systems based on private property, free exchange, and market prices. In capitalist systems, profits and competition drive the economic process that delivers progress, providing powerful incentives to innovate and produce more efficiently. Increasing productivity—greater output from fewer inputs of labor and other resources—means that more and more consumers can afford a wider array of goods and services at lower cost.

Free enterprise gives consumers a pivotal role in determining the path of progress. Collectively, they have an endless list of needs and wants—from the basics of food, clothing, and shelter to luxuries and status symbols. Consumers can meet more of these desires by taking advantage of the specialization and trade that emerges in markets. In a vibrant free-enterprise system, entrepreneurs will be constantly looking for new, better or cheaper ways of increasing consumers' welfare. Innovators don't know for sure what consumers want. They find out

through a process of trial and error and a willingness to take risk. Some innovation won't catch on—i.e., they won't win consumers favor. Others will succeed by making consumers better off in big or small ways. In a free enterprise system, we are all free to take the risk that our innovation will do a better job of meeting consumers' needs and wants. In the end, though, it's the consumer who largely determines which innovations succeed and fail in the marketplace. Free enterprise produces large gains in living standards because it encourages constant innovation as new and existing firms compete for consumers' dollars.

New ideas, new products, new technologies, new forms of industrial organizations, and new markets make most consumers better off; in the process, their spending gives rise to new industries and new companies, creating better jobs for more and more workers. When consumers buy new, better, or cheaper products, they spend fewer old goods and services, disrupting the established economic order and setting up the paradox of progress. Economist Joseph Schumpeter coined the immortal phrase "creative destruction" to describe how capitalism moves relentlessly forward by rewarding innovations that benefit consumers while roiling the existing economic order. Creative destruction's long-term effect on the overall economy is positive. Living standards rise for most people. But new, better, and cheaper consumer goods and services destroy the industries, companies and jobs that no longer produce what consumers want to buy. Faster economic progress will produce more gains in overall living standards, but it means more lost jobs and bankrupt companies.

An understanding of the process of progress leads to the conclusion that most job losses and bankruptcies are a disruptive side-effect of the economic process that delivers progress. Transportation provides a dramatic, ongoing example of creative destruction at work. The introduction of the automobile sparked an upheaval in jobs, creating a multitude of new occupations: car designers, mechanics, and truck, bus and taxi drivers, to name just a few. The automobile's impact spilled over into other sectors of the economy. The oil industry, for example, created new jobs for geologists, roughnecks, and refinery and pipeline workers. Nonexistent in 1870, the automobile industry, directly and indirectly, created millions of jobs in the U.S. economy. And soon after the automobile came the airplane, triggering yet another reshuffling of jobs.

The automobile and the airplane, however, weren't unalloyed benefits. They created unwelcome competition for established transportation industries—everything from the horse-and-buggy trade to railroads and water transport. Jobs disappeared by the millions. The country employed 109,000 carriage and harness makers in 1900 and 238,000 blacksmiths in 1910. Only a few thousand Americans make a living in these occupations today. In 1920, 2.1 million Americans earned their living by working for railroads, compared with just 231,000 today.

The transportation industry's experience has been repeated with thousands of innovations—farm machinery, telephones, television, computers, lasers, fax machines. The list could go on for pages, but it would show a common theme: innovation has always had the direct effect of creating new businesses and industries and the indirect effect of destroying many of the jobs in the existing industries that they eclipsed. The process frees labor in declining industries to produce more and better goods in new industries. In 1900, for example, it took nearly 40 of every 100 Americans to feed the country. Today, it requires just three of every 100. But the decline in farm jobs hasn't left the country hungry. Quite the contrary, the United States has enjoyed agricultural plenty and the creation of millions of industry and service jobs. The 37 of every 100 workers no longer needed on the farm moved on to provide new homes, computers, pharmaceuticals, appliances, movies, stock trades, video games, gourmet meals, and an array of other goods and services. The result is a material abundance that wouldn't have been possible without labor released from farming. Despite a constant turnover in employment, the total number of jobs has expanded over time.

Not all job losses come from creative destruction. Natural disasters or inept management can put companies out of business. Government policies, including taxes and regulation, can make it too costly for some companies to continue employing as many workers. While these forces can destroy jobs, they don't produce any benefits for the economy. No economic progress means no paradox. These job losses are simply a loss to the economy. In Schumpeterian terms, there is no creative destruction—just destruction.

THE HIERARCHY OF HUMAN TALENTS

Advancements in technology don't just shape what we consume. They also affect how we produce, making human beings more productive while changing the very nature of work for most of the labor force. The key to the evolution of work is the tools humans have to use—that is, technology. In the Agricultural Age, with technology relatively primitive, the great bulk of the labor force tilled the soil and harvested crops using muscle power—human as well as animal. As farming became mechanized, it devalued muscle power as machines proved more efficient at plowing, picking, and other tasks. Fewer workers were needed to produce food, and humans moved on to another kind of physical work in Industrial Age factories. Efficient mass production entailed repetitive motion; it required workers manual dexterity and motor skills to pull the levers and push the buttons that controlled the machinery and equipment. The Industrial Age focused on physical inputs and output. It needed to inventory things, measure things, and check boxes on forms—tasks requiring formulaic intelligence, the lowest wattage of brainpower. Once they became powerful enough and cheap enough, computers proved better than humans at the repetitive motions of assembly lines and the drudgery of paperwork. The Information Age devalued physical work and shifted the economy's driving force to mental

activity. More and more people found jobs that put their capacity for analytic reasoning to use. As we go forward, the way we work will once again change as analytic reasoning's value ebbs and a different set of human characteristics rises to the fore—imagination, creativity, emotional intelligence, integrity.

Over time, workers have been climbing the hierarchy of human talents, with each rung representing more highly developed human attribute. The U.S. labor force includes jobs at all levels. However, the array of opportunities, particularly for new jobs seekers, will be skewed toward the attributes at the top of the hierarchy.

PAST INNOVATION

DATE: _____

NAME: _____ PERIOD/SECTION: _____

Choose an innovation from the past— example: refrigeration

(You may choose the railroad, the automobile, the computer, motion pictures, recorded music or whatever you find interesting).

Describe the “new” technology and the need it served.

Now identify how people met that need prior to the innovation (before refrigeration, for example, the daily delivery of ice blocks to homes).

Identify five types of jobs that became obsolete because of your chosen invention.

- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____

And five types that grew in the wake of the innovation.

- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____

List 5 ways you think the innovation you selected affected the lives of most people—in terms of convenience, health, safety, comfort, enjoyment.

- 1 Convenience _____
- 2 Health _____
- 3 Safety _____
- 4 Comfort _____
- 5 Enjoyment _____

FROM HORSE POWER TO HORSEPOWER

BY ERIC MORRIS

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In 1898, delegates from across the globe gathered in New York City for the world's first international urban planning conference. One topic dominated the discussion. It was not housing, land use, economic development, or infrastructure. The delegates were driven to desperation by horse manure.

The horse was no newcomer on the urban scene. But by the late 1800s, the problem of horse pollution had reached unprecedented heights. The growth in the horse population was outstripping even the rapid rise in the number of human city dwellers. American cities were drowning in horse manure as well as other unpleasant byproducts of the era's predominant mode of transportation: urine, flies, congestion, carcasses, and traffic accidents. Widespread cruelty to horses was a form of environmental degradation as well.

The situation seemed dire. In 1894, *The Times* of London estimated that by 1950 every street in the city would be buried nine feet deep in horse manure. One New York prognosticator of the 1890s concluded that by 1930 the horse droppings would rise to Manhattan's third story windows. A public health and sanitation crisis of almost unimaginable dimensions loomed.

And no possible solution could be devised. After all, the horse had been the dominant mode of transportation for thousands of years. Horses were absolutely essential for the functioning of the nineteenth century city—for personal transportation, freight haulage, and even mechanical power. Without horses, cities would quite literally starve.

All efforts to mitigate the problem were proving woefully inadequate. Stumped by the crisis, the urban planning conference declared its work fruitless and broke up in three days instead of the scheduled ten.

SADDLED WITH THE URBAN HORSE

The horse pollution problem was not a new one. Julius Caesar banned horse drawn carts from ancient Rome between dawn and dusk in an effort to curb gridlock, noise, accidents, and other unpleasant byproducts of the urban equine. But conditions in the nineteenth century pushed the problem to new heights. First, America's urban population swelled by thirty million souls between 1800 and 1900.

These new citizens needed to be fed, clothed, and sheltered using materials delivered by horse. Second, despite the fact that cities were expanding outward, the tidal wave of new residents sent density levels soaring; New York's rose from 39,183 per square mile in 1800 to 90,366 per square mile in 1900. Greater human crowding meant greater horse crowding as well, and problems that might have been tolerable in a sparsely populated rural region became unbearable in a densely packed urban one.

Not only was the absolute number of people rising; per capita reliance on the horse was rising as well. Living standards were sky-rocketing—from 1800 to 1900, US per capita GDP rose from \$1,148 to \$4,676 (in 2000 dollars). This meant greater trade, and virtually all goods were, at some point in their journey, transported by horse. In ten major U.S. cities, the number of teamsters rose 328 percent between 1870 and 1900, while the population as a whole rose only 105 percent.

At first glance, it might seem as if the railroad would have offered relief from the horse pollution problem. But in fact, it exacerbated it. Railroads were as much a complement for horses as a substitute for them. Nearly every item shipped by rail needed to be collected and distributed by horses at both ends of the journey. So, as rail shipments boomed, so did shipments by horse. Ironically, railroads tended to own the largest fleets of horses in nineteenth century cities.

This situation was made even worse by the introduction of the horse into an area from which it had been conspicuously absent: personal intra urban transportation. Prior to the nineteenth century, cities were traversed almost exclusively on foot. Mounted riders in U.S. cities were uncommon, and due to the expense, slow speeds, and jarring rides, private carriages were rare; in 1761, only eighteen families in the colony of Pennsylvania (population 250,000) owned one. The hackney cab, ancestor of the modern taxi, was priced far beyond the means of the ordinary citizen.

This changed with the introduction of the omnibus in the 1820s. Essentially large stagecoaches traveling fixed routes, these vehicles were reasonably priced enough to cater to a much larger swathe of the urban population. By 1853 New York omnibuses carried 120,000 passengers per day. Needless to say, this required a tremendous number of horses, given that a typical omnibus line used eleven horses per vehicle per day. And the need for horses was to spiral even further when omnibuses were placed on tracks, increasing their speeds by fifty percent and doubling the load a horse could pull. Fares dropped again and passengers clamored for the new service. By 1890 New Yorkers took 297 horse car rides per capita per year.

MAKING HAY: FEEDING THE URBAN HORSE

The consequences of the horse population boom were sobering. While the horse may be a charming and even romantic animal, when packed into already teeming and unsanitary cities its environmental byproducts created an intolerable situation.

Horses need to eat. According to one estimate each urban horse probably consumed on the order of 1.4 tons of oats and 2.4 tons of hay per year. One contemporary British farmer calculated that each horse consumed the product of five acres of land, a footprint which could have produced enough to feed six to eight people. Probably fifteen million acres were needed to feed the urban horse population at its zenith, an area about the size of West Virginia. Directly or indirectly, feeding the horse meant placing new land under cultivation, clearing it of its natural animal life and vegetation, and sometimes diverting water to irrigate it, with considerable negative effects on the natural ecosystem.

And what goes in must come out. Experts of the day estimated that each horse produced between fifteen and thirty pounds of manure per day. For New York and Brooklyn, which had a combined horse population of between 150,000 and 175,000 in 1880 (long before the horse population reached its peak), this meant that between three and four million pounds of manure were deposited on city streets and in city stables every day. Each horse also produced about a quart of urine daily, which added up to around 40,000 gallons per day for New York and Brooklyn.

The aesthetics of the situation require little editorial comment. Horse droppings were not only unsightly but their stench was omnipresent in the nineteenth century city. Urban streets were minefields that needed to be navigated with the greatest care. "Crossing sweepers" stood on street corners; for a fee they would clear a path through the mire for pedestrians. Wet weather turned the streets into swamps and rivers of muck, but dry weather brought little improvement; the manure turned to dust, which was then whipped up by the wind, choking pedestrians and coating buildings. Municipal street cleaning services across the country were woefully inadequate.

Moreover, thanks to the skyrocketing horse population, even when it had been removed from the streets the manure piled up faster than it could be disposed of. Manure makes fine fertilizer, and an active manure trade existed in the nineteenth century city.

However, as the century wore on the surge in the number of horses caused the bottom to fall out of this market; while early in the century farmers were happy to pay good money for the manure, by the end of the 1800s stable owners had to pay to have it carted off. As a result of this glut (which became particularly severe in summer months when farmers were unable to

leave their crops to collect the dung), vacant lots in cities across America became piled high with manure; in New York these sometimes rose to forty and even sixty feet. Needless to say, these were not particularly beloved by the inhabitants of the nineteenth century city.

FILTH, FLIES, AND FATALITIES

The problem extended far beyond aesthetics. Though horse manure harbors tetanus spores, in and of itself, it is not a major health risk. But a byproduct of it is. Horse manure is the favored breeding ground for the house fly, and clouds of flies hatched in it (one estimate is that three billion flies hatched in horse manure per day in U.S. cities in the year 1900).

Vacant lots across America were piled high with manure; in New York these some-times rose to forty and even sixty feet.

A fallen horse would be shot on the spot or abandoned to die, creating an obstruction that clogged streets and brought traffic to a halt. Flies are, of course, unsightly and annoying pests, and they are also potent disease vectors. Flies pick up bacteria and other pathogens on their feet, hairy appendages, and proboscides, then transmit them as they fly between filth and humans and their food. They also deposit germs through their feces and vomit. Flies transmit dozens of diseases, and studies have found that nineteenth century outbreaks of deadly infectious maladies like typhoid and infant diarrheal diseases can be traced to spikes in the fly population.

REIN OF TERROR: THE HORSE AND ACCIDENTS

Horses killed in other, more direct ways as well. As difficult as it may be to believe given their low speeds, horse drawn vehicles were far deadlier than their modern counterparts. In New York in 1900, 200 persons were killed by horses and horse-drawn vehicles. This contrasts with 344 auto-related fatalities in New York in 2003; given the modern city's greater population, this means the fatality rate per capita in the horse era was roughly 75 percent higher than today. Data from Chicago show that in 1916 there were 16.9 horse related fatalities for each 10,000 horse-drawn vehicles; this is nearly seven times the city's fatality rate per auto in 1997.

The reason is that horse drawn vehicles have an engine with a mind of its own. The skittishness of horses added a dangerous level of unpredictability to nineteenth century transportation. This was particularly true in a bustling urban environment, full of surprises that could shock and spook the animals. Horses often stampeded, but a more common danger came from horses kicking, biting, or trampling bystanders. Children were particularly at risk.

In addition, the vehicles themselves (especially the omnibus) presented safety hazards. They were difficult to brake, and the need to minimize friction meant that they required large

wheels. These made for top heavy, ungainly carriages prone to capsizing, a problem exacerbated by winding street layouts. Moreover, drivers had a reputation for recklessness.

CLATTER AND CONGESTION

Other byproducts of the urban horse were less deadly but unwelcome nevertheless. The clatter of horseshoes and wagon wheels on cobblestone pavement jangled nineteenth century nerves. Many have blamed the noise created by iron horseshoes on hard pavement for the nervous disorders which seemed to plague cities far more than rural areas.

Congestion was another problem. Traffic counts indicate that traffic across the nation more than doubled between 1885 and 1905. Not only was the number of vehicles rising rapidly, but the nature of the vehicles themselves caused tremendous problems. A horse and wagon occupied more street space than a modern truck. Obviously, horse drawn vehicles traveled at very slow speeds, and horses, especially those pulling heavy loads or hitched in teams, started forward very slowly, a great difficulty in stop and go conditions. Streets of the era were not adequate to handle the traffic, and hills caused problems.

In addition, horses often fell, on average once every hundred miles of travel. When this took place, the horse (weighing on average 1,300 pounds) would have to be helped to its feet, which was no mean feat. If injured badly, a fallen horse would be shot on the spot or simply abandoned to die, creating an obstruction that clogged streets and brought traffic to a halt. Dead horses were extremely unwieldy, and although special horse removal vehicles were employed, the technology of the era could not easily move such a burden. As a result, street cleaners often waited for the corpses to putrefy so they could more easily be sawed into pieces and carted off. Thus, the corpses rotted in the streets, sometimes for days, with less than appealing consequences for traffic circulation, aesthetics, and public health.

TAIL OF WOE: THE SAD LOT OF THE URBAN HORSE

Falls were not the only reason horses expired in the streets. One might think it would be in the interest of horse owners to keep their animals in good condition; a horse was a fairly large capital investment. But unfortunately, economics caused owners to reach quite the opposite conclusion. Due to the costs of feeding the animals and stabling them on expensive urban land, it made financial sense to rapidly work a small number of horses to death rather than care for a larger group and work them more humanely. As a result, horses were rapidly driven to death; the average streetcar horse had a life expectancy of barely two years. In 1880, New York carted away nearly 15,000 dead equines from its streets, a rate of 41 per day.

In addition to frequent whippings and beatings from drivers, urban horses faced another peril: the condition of the street surfaces. Paved streets were far more slippery than the dirt roads

they replaced. They were especially slick when wet or frozen. Horses, shod in iron shoes providing poor traction, frequently lost their step and tumbled, often to their deaths.

STABLE CONDITION

All of these problems—the filth, flies, disease, and cruelty—came to a head in the nineteenth century stable. Stables were generally dark and lacked ventilation; some were rarely cleaned and reeked of excrement. Due to the expense of urban land, horses were crowded into them. This was not just uncomfortable; it was deadly as well, as it left horses open to the ravages of infectious disease. The Great Epizootic Epidemic of 1872 killed approximately five percent of the urban horses in the Northeast and debilitated many others. Transportation halted, food prices soared, goods piled up at the docks. Fire ravaged downtown Boston because there were not enough healthy horses to pull the fire trucks.

THE CAR BEFORE THE HORSE

Society eventually acted against the problem on numerous fronts. Henry Bergh founded the ASPCA in 1866 primarily to improve the lot of the urban horse. In the 1890s, Col. George E. Waring Jr. professionalized New York's street sweeping service with tremendous effect; his reforms were widely copied across the country. At the same time, the electric streetcar usurped the horse's role as the primary mode for intra urban personal transportation. At the turn of the 20th century, William Phelps Eno invented the rules of the road to reduce the number of accidents caused by horse drawn vehicles; he is credited with devising the stop sign, the stop light, the yield sign, the crosswalk, the pedestrian island, the one-way street, the traffic circle, and the taxi stand. In addition, he codified driving on the right side of the road.

But it would take one more innovation to end the problem once and for all. In the 1890s, improvements in the internal combustion engine, legal and political developments which severely restricted the power of cities to regulate the types of traffic on their streets (won by bicycle advocates), the afore mentioned invention of traffic rules, and smooth new asphalt street surfaces paved the way for the private automobile.

Enticed by high speeds, point to point travel and the flexibility to roam across the urban landscape, the public adopted the new innovation in droves. Contemporary observers calculated that cars were cheaper to own and operate than horse drawn vehicles, both for the individual and for society. In 1900, 4,192 cars were sold in the U.S.; by 1912, that number had risen to 356,000. In 1912, traffic counts in New York showed more cars than horses for the first time. The equine was not replaced all at once, but function by function. Freight haulage was the last bastion of horse drawn transportation; the motorized truck finally supplanted the horse cart in the 1920s.

As difficult as it may be to believe for the modern observer, at the time the private automobile was widely hailed as an environmental savior. In the span of two decades, technology eradicated a major urban planning nightmare that had strained governments to the breaking point, vexed the media, tormented the citizenry, and brought society to the brink of despair. Yet, given the environmental problems that the automobile has brought, it is worth asking: was this a Faustian bargain?

HORSE POWER TO HORSEPOWER

In all probability the answer is no. Perhaps in total the negative externalities produced by the automobile are greater than the damage caused by the urban horse, but this is because the numbers of vehicles and the amount of travel have skyrocketed. Per vehicle and per mile, it seems highly likely that the environmental problems caused by the horse were far greater than those of the modern car. Horses even contribute to global warming: manure releases methane, a greenhouse gas eight times more potent than CO₂.

The environmental triumph of the private automobile sheds interesting light on modern problems of transportation and the environment. Today, many observers believe that only a drastic reduction of travel and/or a switch to slower and more inconvenient modes can mitigate transportation's negative externalities. But neither draconian regulations nor disincentives for travel were necessary to fix the horse pollution problem. Human ingenuity and technology (enabled by government, which provided infrastructure and regulations) did the job—and at the same time they brought a tremendous concurrent increase in mobility. Of course, the technological solution brought externalities of its own, and our solutions for those externalities will undoubtedly introduce a fresh set of unexpected problems. But with determination and inventiveness, perhaps one day the environmental consequences of the private car will be as dim a memory as the horse pollution crisis of the nineteenth century.

FROM HORSE POWER TO HORSEPOWER

DATE: _____

NAME: _____ PERIOD/SECTION: _____

Read the Article: From Horse Power to Horsepower By: Eric Morris

Then, write a List of Pros and Cons of Horses being used as the main means of transportation in a city.

	PROS	CONS
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

HIERARCHY OF HUMAN TALENTS

DATE: _____

NAME: _____ PERIOD/SECTION: _____

Advancements in technology don't just shape what we consume. They also affect how we produce, making human beings more productive while changing the very nature of work for most of the labor force. The key to the evolution of work is the tools humans have to use—that is, technology. In the Agricultural Age, with technology relatively primitive, the great bulk of the labor force tilled the soil and harvested crops using muscle power—human as well as animal. As farming became mechanized, it devalued muscle power as machines proved more efficient at plowing, picking and other tasks. Fewer workers were needed to produce food, and humans moved on to another kind of physical work in Industrial Age factories. Efficient mass production entailed repetitive motion; it required workers manual dexterity and motor skills to pull the levers and push the buttons that controlled the machinery and equipment. The Industrial Age focused on physical inputs and output. It needed to inventory things, measure things and check boxes on forms—tasks requiring formulaic intelligence, the lowest wattage of brainpower. Once they became powerful enough and cheap enough, computers proved better than humans at the repetitive motions of assembly lines and the drudgery of paperwork. The Information Age devalued physical work and shifted the economy's driving force to mental activity. More and more people found jobs that put their capacity for analytic reasoning to use. As we go forward, the way we work will once again change as analytic reasoning's value ebbs and a different set of human characteristics rises to the fore—imagination, creativity, emotional intelligence, integrity. Over time, workers have been climbing the hierarchy of human talents, with each rung representing more highly developed human attribute. The U.S. labor force includes jobs at all levels. However, the array of opportunities, particularly for new jobs seekers, will be skewed toward the attributes at the top of the hierarchy.

This also translates into wages as we can see in the following chart:

2014 AVERAGE ANNUAL WAGES		2014 AVERAGE ANNUAL WAGES	
<u>INTEGRITY / HONESTY / TRUST / BRAND</u>		<u>FORMULAIC INTELLIGENCE</u>	
ANESTHESIOLOGISTS	\$246,320	LIBRARIANS	\$51,110
PHYSICIANS AND SURGEONS	\$194,990	TAX PREPARERS	\$50,140
CHIEF EXECUTIVES	\$180,700	HEALTH TECHNICIANS	\$47,520
ARCHITECTURAL ENGINEERS	\$138,720	BOOKKEEPERS	\$38,070
AIRLINE PILOTS AND FLIGHT ENGINEERS	\$131,760	SECRETARIES AND TYPISTS	\$34,500
<u>PEOPLE SKILLS</u>		<u>MANUAL DEXTERITY</u>	
PSYCHIATRISTS	\$182,700	TOOL AND DIE MAKERS	\$50,090
LAWYERS	\$133,470	CONSTRUCTION EQUIPMENT OPERATORS	\$47,340
MARKETING AND SALES MANAGERS	\$129,900	LATHE OPERATORS	\$37,370
HUMAN RESOURCES MANAGERS	\$114,140	BUTCHERS	\$30,380
FINANCIAL SERVICES SALESPERSONS	\$103,260	SEWING MACHINE OPERATORS	\$23,990
<u>IMAGINATION / CREATIVITY</u>		<u>MUSCLE POWER</u>	
SOFTWARE DESIGNERS AND ENGINEERS	\$101,863	FISHING WORKERS	\$36,280
ART DIRECTORS	\$97,850	GARBAGE COLLECTORS	\$36,030
ARCHITECTS	\$80,490	MATERIAL MOVERS AND LOADERS	\$28,120
FASHION DESIGNERS	\$73,690	GROUNDSKEEPERS	\$26,720
WRITERS	\$71,950	AGRICULTURAL WORKERS	\$22,870
<u>ANALYTIC REASONING</u>			
ACTUARIES	\$110,090		
ELECTRONIC ENGINEERS	\$97,460		
FINANCIAL ANALYSTS	\$92,250		
MEDICAL SCIENTISTS	\$90,160		
COMPUTER PROGRAMMERS	\$82,690		

Student

Activity:

Identify occupations that primarily require workers to use each of the hierarchy's innately human attributes: muscle power, manual dexterity/motor skills, formulaic intelligence, analytical reasoning, imagination/creativity, people skills and integrity/honesty/trust/brand.

Keep in mind a question like this:

Does the bricklayer use the same skills as the programmer who created video games?

Write 21 Professions in any order. Do not use the ones in the previous chart.

- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____
- 6 _____
- 7 _____
- 8 _____
- 9 _____
- 10 _____
- 11 _____

- 12 _____
- 13 _____
- 14 _____
- 15 _____
- 16 _____
- 17 _____
- 18 _____
- 19 _____
- 20 _____
- 21 _____

Now classify these professions by these human attributes: muscle power, manual dexterity/motor skills, formulaic intelligence, analytical reasoning and imagination/creativity, people skills and integrity/honesty/trust/brand.

Muscle Power	Manual Dexterity/ Motor Skills	Formulaic Intelligence	Analytical Reasoning

Imagination/Creativity	People Skills	Integrity/Trust/Brand