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# CONCEPTS IN THE REAL WORLD

# SUPERMARKET TRIP

**The following highlights numerous links between the *Atlas of Human Imagination* and a trip to the supermarket:**

- Hippocrates was the first promoter of good hygiene, food quality and nutritional awareness, with his famous quote “let food be thy medicine”
- Plato’s space-filling solids are essential in the packaging industry where efficiency of packing is an important aspect of shipping and storage, as with Tetra Pak
- Archimedes invented the rotating screw which is widely used in the food industry today, as twin screw extruders, for making everything from sausages to pet food
- Fibonacci’s series appears in all kinds of vegetables, such as pineapples, broccoli, cauliflower, artichokes, sunflower seeds

- Al-Jazari's miniature automata are early precursors to the robotic equipment and sensors seen in supermarket today
- Henry the Navigator's oceanic exploration brought back many exotic food items from Africa and the Far East including sugar, vanilla, cinnamon, nutmeg, herbs and citrus fruits
- Gutenberg's printing press helped share information and, in the modern era, it now permits advertising and food information
- Da Vinci's mechanical inventions included conveyer belts, which could transport materials and rock, and are now commonplace in all supermarkets
- Bacon believed that improving human health and safety was one of science's highest goals - and his surname happens to be *bacon*
- Descartes's XYZ coordinates are used in supermarkets for positioning of aisles, shelves, food products, grid-based layouts and all inventory tracking
- Pascal's work on pressure led to major breakthroughs in vacuum technology which are used today for plastic sealing of perishable food products
- Leeuwenhoek's microscopes are now used in the modern era to understand perishability and the microbial safety of food that goes into our supermarkets
- Newton's work on light, optics, colour and lenses is used in all supermarkets for barcode readers and QR code scanners
- Linnaeus's taxonomy system is one of the cornerstones of biology, and without it, food science and agriculture would be pure guesswork
- Euler's equations for fluid flow are used today to design and model the coolant channels in refrigerators for freezing and chilling our food products
- Lavoisier's chemical elements and the law of conservation of mass are essential to modern biochemistry and food science
- Goethe's *Urpflanze* concepts are early expressions of evolution, biological development of plants and morphological medicine
- Jenner's vaccination work was particularly important in the 2020s when the COVID-19 outbreak caused major disruption to food supplies and supermarkets' opening times
- Volta's first battery is the precursor to the backup-power supplies at large supermarkets and the small batteries in portable scanners and handheld tablets

- Gauss's normal distribution is used today to helps retailers find optimal price points, balance supply and demand, and anticipate promotional spikes
- Berzelius's work is a foundation stone in biochemistry; and he also discovered proteins and named several vitamins that we see on our supermarket shelves
- Faraday's electromagnetism is widely used today in all supermarkets for generators, pumps, fridges, fans, the motors that move the conveyer belts, and even RFID tags
- Lovelace's computer algorithms are the basis today of all food industry software, databases and digital logistics
- Joule's studies of energy are critical for the study of metabolism, calorie intake and nutritional content, all relevant to the food industry now
- Boole's logic system underpins every digital device in a supermarket and all the databases in the background
- Kelvin's work on thermodynamics, temperature measurement and energy systems underpins modern refrigeration and climate control, which are central to supermarkets
- Nightingale's approach to healthcare emphasised cleanliness, hand-washing, good ventilation and sanitation to prevent disease, all of which are crucial to supermarkets
- Darwin's discovery of evolution is a triumph in biology, and it still underpins the whole agricultural and food industry including techniques like genetic modification
- Pasteur's germ theory and sterilisation are fundamental to the food industry, and the word "pasteurised" will be in every supermarket on the planet
- Mendel's law of inheritance in pea plants gave birth to our understanding of genes, and the whole topic of genetics in the food industry
- Mendeleev's periodic table led to many new discoveries in chemicals, fertilisers, preservatives, antioxidants and other additives used in food products
- Maxwell's equations are at the heart of many supermarket devices like checkout registers, scanners, refrigerators and RFID anti-theft tags
- Tesla's work on AC electricity now powers every supermarket around the world, with both single and three-phase AC electrical circuits
- Nansen's polar expeditions brought a wealth of knowledge related to frozen food and hermetic sealing, which are foundational to modern refrigeration in supermarkets

- Arrhenius's equation of kinetics is critical to our understanding food spoiling reaction rates, as a function of temperature and time, which can then predict shelf life
- Freud's theories of the unconscious mind, desire and reward inform why people buy certain products, such as comfort foods, sweets, snacks, alcohol and other cravings
- Wright brothers' airplane invention quickly led to global flights, which are now regularly used to transport perishable fruits and flowers to our supermarkets
- Einstein's photoelectric effect underpins all scanners, detectors and sensors used in supermarkets today
- Gropius's *Bauhaus* movement was important for the design of modern supermarkets, where function and safety are both very important design criteria
- Escher's geometric repetitions and optical illusions have been used by many supermarket companies in their packaging design to make certain products stand out on shelves
- Marconi's wireless radio is still used today for walkie-talkies and pagers, behind-the-scenes in a supermarket, as well as for modern wifi signals for shopfloor internet
- Turing's universal computation is the blueprint of all digital computing, underpinning the whole food and supermarket industry
- Waddington's epigenetic insights are used today to help optimise crops for yield, drought resistance and nutritional content
- von Neumann's computer architecture is critical today for all informatics inside a supermarket
- Bardeen's transistor switch is the electronic backbone of every computer and therefore every modern supermarket in the world
- Shannon's information theory explains how to efficiently encode, transmit and correct errors in digital data when scanning barcodes and QR codes
- Buckminster Fuller's architectural principles are still used to design large-span supermarket roofs and warehouses, using steel beams and glass panels
- Feynman's quantum physics underpins all digital scales, scanners and cash registers that rely upon microchips and semiconductor technology
- Franklin's understanding of DNA structure and heredity enables selective breeding of livestock for better milk, meat and eggs

- Hopper's programming languages and compilers are still the basis of all computer systems used in food factories, logistic centres and supermarkets today
- Huxley's novel *Brave New World* warned against the dangers of mass production, standardised food, fortified food and the ultra-processing of convenience food
- Warhol's artwork featured a whole host of everyday food items, like bananas, chocolate bars, coke bottles and tins of Campbell's soup, influencing supermarket packaging today
- von Braun's Moon missions helped develop new food techniques like freeze-drying vacuum sealing, shelf-stable ready meals, instants soups and frozen foods
- Lovelock's *Gaia* hypothesis is fundamental to agriculture and food production on Earth, especially in view of imminent climate change today
- Mandelbrot's self-similar fractals are used to create hierarchical structures in warehouse layout, distribution networks and delivery routing for the supermarket industry
- Dawkins's evolutionary principles are relevant to disease-resistant crops, high-yield produce and livestock breeding
- Berners-Lee's creation of the internet underpins everything related to supermarket operations, supply chains, logistics, online shopping and advertising
- Wilmut's cloning work allows scientists to replicate animals and livestock with desirable traits, such as high milk yield, disease resistance and faster growth rates
- Hinton's AI work is now having big impacts in supermarkets with the introduction of computer vision, self-checkouts and cashier-less stores