Science J—Weekly Subject List

Week	Subject	History Reference
1	Aerodynamic shapes; engineering; Force = surface area * pressure * coefficient of drag; Newtons	Thales / *Aristotle Leads the Way*, pp. 36-43
2	Atomic structure; electron shells; static electricity; electron affinity; friction; electron transfer; hypotheses	Thales / *Aristotle*, p. 38
3	Mass; weight; F=m*a; gravity; g=9.8m/s^2; the effect of horizontal motion on a freefalling object	Aristotle, Newton / *Aristotle*, pp. 94-105
4	Hydraulics; mechanical advantage; Pressure = Force / Area	Hero of Alexandria / *Aristotle*, pp. 130-135
5	Basic machines; lever, pulley, wedge, wheel and axle, screw, inclined plane; Mechanical Advantage of Wheel and Axle = Radius of Wheel/Radius of Axle	Hero of Alexandria / *Aristotle*, pp. 130-135
6	Basic machines; First-class levers; mechanical advantage; Mass 1 * Distance 1 = Mass 2 * Distance 2	Archimedes / *Aristotle*, pp. 146-159
7	Compound Machines; inclined plan and screw; Archimedes' Screw;	Archimedes / *Aristotle*, pp. 146-159
8	Density = Mass / Volume; intrinsic value of coins; finding volume using water displacement; reading a meniscus	Archimedes / *Aristotle*, pp. 150-153
9	Compound Machines; wheel and axle; inclined plane; Work = Force * Distance	Filippo Brunelleschi / *Newton at the Center*, p. 7
10	Bridge efficiency; Da Vinci self-supporting bridge	Leonardo Da Vinci / *Newton* p. 33
11	Pendulums; periods and cycles; effect of weight and length of pendulum on the period; Period = $2 * \pi \sqrt{l/g}$	Galileo Galilei / *Newton* pp. 65-66
12	Telescopes; concave and convex lenses; radius of a lens; focus of a lens; angles of incidence and refraction	Galileo, Newton, Digges / *Newton* p. 108
13	Newton's Law of Universal Gravitation; $F = G * (m_1 * m_2 / r_2)$; F=m*a; g = 9.8 m/$s^2$; although objects drop at the same rate, objects with more mass can hit with more force	Isaac Newton / *Newton* pp. 144-153
14	Newton's Third Law: For every action there is an equal and opposite reaction;	Isaac Newton / *Newton*, pp. 172-177
15	Newton's Second Law: F = m*a; acceleration = $\Delta V/\Delta t$; momentum = mass * ΔV; interaction between Newton's Second and Third Laws	Isaac Newton / *Newton*, p. 174
16	Newton's First Law, Law of Inertia; inertia vs. momentum	Isaac Newton / *Newton*, p. 173
17	Bernoulli's Principle; fluid dynamics; drag, lift, and gravity;	Daniel Bernoulli / *Newton*, pp. 220-229
18	Bernoulli's Law; the height of a column of fluid affects the pressure and therefore velocity of an escaping stream of fluid; conservation of energy; velocity = √(2*g*height)	Daniel Bernoulli / *Newton*, pp. 220-229
19	Electrolysis; electroplating; anodes; cathodes; ions; anions; cations; electric current	Humphry Davy / *Newton*, p. 331
20	Electromagnetism; electric and magnetic fields flow at 90° to each other; Lenz Effect; conductive materials	James Clerk Maxwell / *Newton*, p. 361
21	Sounds waves; wavelength and frequency; compressing air molecules; frequency; harmonics; v=f*λ; out-of-family results in a lab test	Pythagoras, Hertz / *Newton* pp. 366-368
22	Waves; v=f*λ; Hertz; speed of electromagnetic waves and light; electromagnetic spectrum	Albert Michelson / *Newton* p. 424
23	Magnets; poles; magnetic fields; free-body diagrams; vectors	William Gilbert / *Einstein Adds a New Dimension*, pp. 10-12
24	Light duality; light acts as a particle; photoelectric effect; photons; UV light; electromagnetic spectrum; electroscopes	Christiaan Huygens, Albert Einstein, Robert Millikan / *Einstein*, pp. 82-94

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25	Light duality; light acts as a wave; double-slit experiment; wave interference patterns; parallel and concentric light waves	Thomas Young, Louis de Broglie / *Einstein*, p. 88
26	Bohr's atom; electron shells; photons; elemental absorption and emission spectrums; wavelengths of visible light	Niels Bohr / *Einstein* pp. 114-127
27	Thermodynamics; entropy; probability; statistics in quantum physics; Gaussian curves	Werner Heisenberg / *Einstein* pp. 150-157
28	1st Law of Thermodynamics: energy can be transformed but not destroyed; types of energy: chemical, gravitational, mechanical, nuclear, potential, kinetic, heat;	Julius Robert von Mayer / *Newton* pp. 394-399
29	2nd Law of Thermodynamics: entropy is always increasing, work must be added to return to a state of lower entropy; entropy; effects of temperature on particles	William Thomson, Ludwig Boltzmann / *Newton* pp. 400-411
30	Quantum electrodynamics; magnetism; creating magnets; electron spin; atomic energy levels	Robert Oppenheimer / *Einstein*, pp. 254-259
31	Speed of sound; $v=f*\lambda$; resonation of sound	Various / *Einstein* p. 273
32	Electric motors; homopolar motors; Lorentz Force; electric fields; magnetic fields; current; right-hand-rule	Hendrik Lorentz / *Einstein*, pp. 61, 160, 271, 283, 289
33	Doppler Effect; relative frequency; sound and light waves	Christian Doppler / *Einstein*, p. 331
34	Archimedean spiral; cartesian graphs; polar graphs; rotation angle (θ); the scientific method; $f_{observer} = f_{source}/(1 \pm (v/c))$	Archimedes / *Archimedes and the Door of Science*, Appendix
35	Angular momentum; right-hand-rule; vectors along x, y, and z axis; torque; $\tau=F*r$; gyroscopic precession in relation to gravity;	N/A
36	Review	N/A