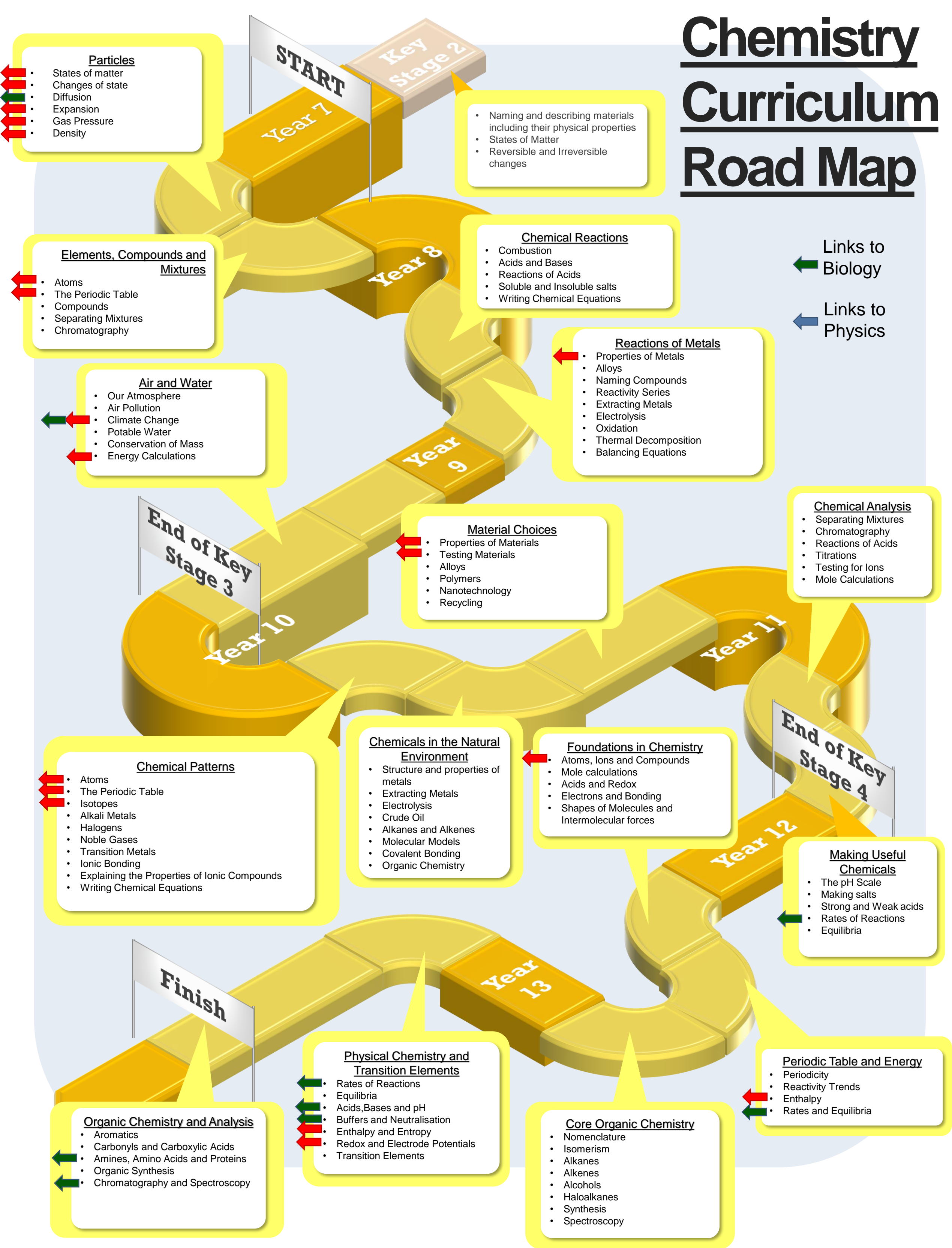
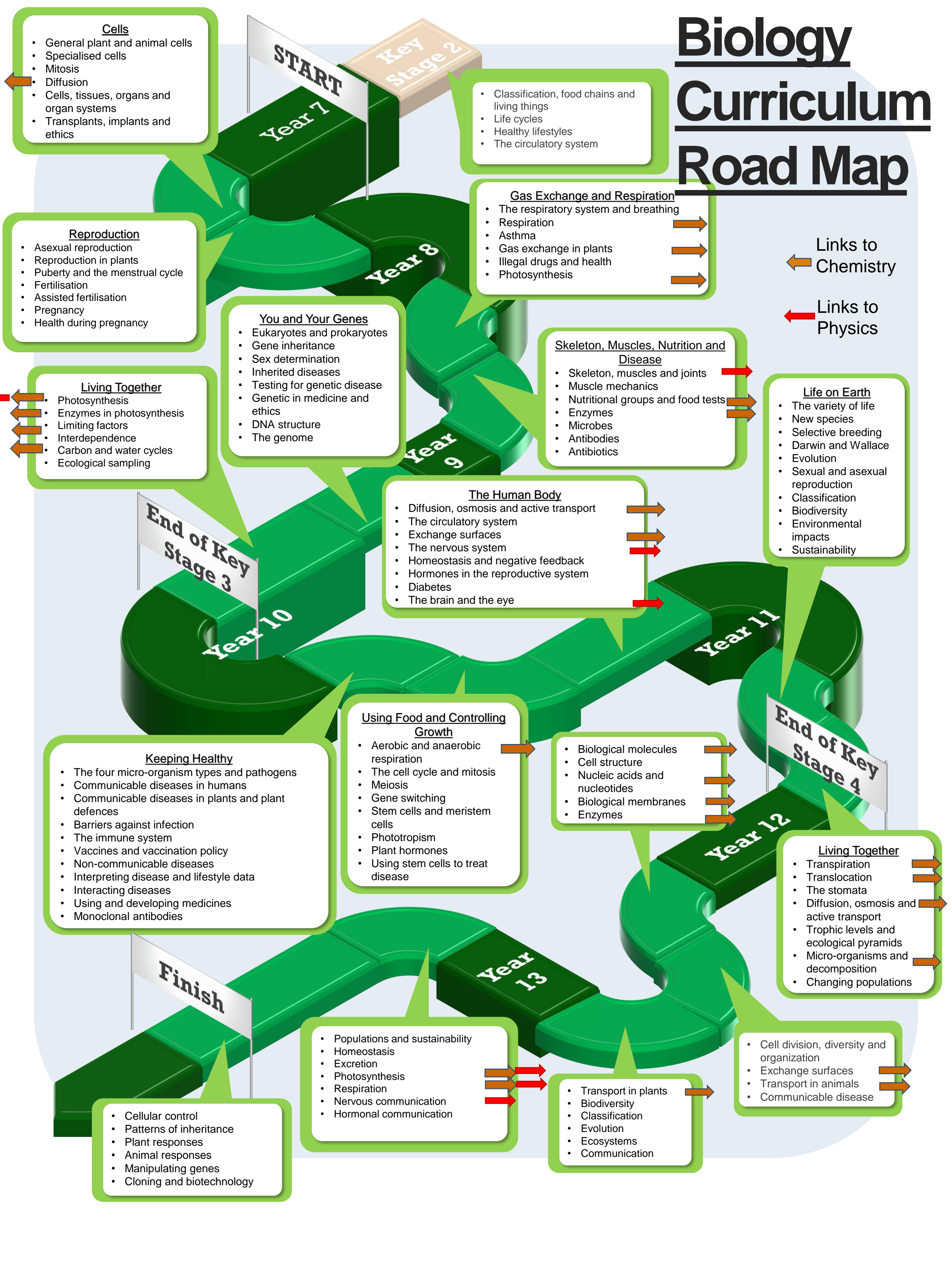


# Chemistry Curriculum Road Map





# Biology Curriculum Road Map



- Cells**
- General plant and animal cells
  - Specialised cells
  - Mitosis
  - Diffusion
  - Cells, tissues, organs and organ systems
  - Transplants, implants and ethics

- Reproduction**
- Asexual reproduction
  - Reproduction in plants
  - Puberty and the menstrual cycle
  - Fertilisation
  - Assisted fertilisation
  - Pregnancy
  - Health during pregnancy

- Living Together**
- Photosynthesis
  - Enzymes in photosynthesis
  - Limiting factors
  - Interdependence
  - Carbon and water cycles
  - Ecological sampling

- You and Your Genes**
- Eukaryotes and prokaryotes
  - Gene inheritance
  - Sex determination
  - Inherited diseases
  - Testing for genetic disease
  - Genetic in medicine and ethics
  - DNA structure
  - The genome

- The Human Body**
- Diffusion, osmosis and active transport
  - The circulatory system
  - Exchange surfaces
  - The nervous system
  - Homeostasis and negative feedback
  - Hormones in the reproductive system
  - Diabetes
  - The brain and the eye

- Using Food and Controlling Growth**
- Aerobic and anaerobic respiration
  - The cell cycle and mitosis
  - Meiosis
  - Gene switching
  - Stem cells and meristem cells
  - Phototropism
  - Plant hormones
  - Using stem cells to treat disease

- Keeping Healthy**
- The four micro-organism types and pathogens
  - Communicable diseases in humans
  - Communicable diseases in plants and plant defences
  - Barriers against infection
  - The immune system
  - Vaccines and vaccination policy
  - Non-communicable diseases
  - Interpreting disease and lifestyle data
  - Interacting diseases
  - Using and developing medicines
  - Monoclonal antibodies

- Cellular control
- Patterns of inheritance
- Plant responses
- Animal responses
- Manipulating genes
- Cloning and biotechnology

- Populations and sustainability
- Homeostasis
- Excretion
- Photosynthesis
- Respiration
- Nervous communication
- Hormonal communication

- Transport in plants
- Biodiversity
- Classification
- Evolution
- Ecosystems
- Communication

- Cell division, diversity and organization
- Exchange surfaces
- Transport in animals
- Communicable disease

- Classification, food chains and living things
- Life cycles
- Healthy lifestyles
- The circulatory system

- Gas Exchange and Respiration**
- The respiratory system and breathing
  - Respiration
  - Asthma
  - Gas exchange in plants
  - Illegal drugs and health
  - Photosynthesis

- Skeleton, Muscles, Nutrition and Disease**
- Skeleton, muscles and joints
  - Muscle mechanics
  - Nutritional groups and food tests
  - Enzymes
  - Microbes
  - Antibodies
  - Antibiotics

- Life on Earth**
- The variety of life
  - New species
  - Selective breeding
  - Darwin and Wallace
  - Evolution
  - Sexual and asexual reproduction
  - Classification
  - Biodiversity
  - Environmental impacts
  - Sustainability

Links to Chemistry

Links to Physics

End of Key Stage 3

End of Key Stage 4

Finish

START

Key Stage 2

Year 7

Year 8

Year 9

Year 10

Year 11

Year 12

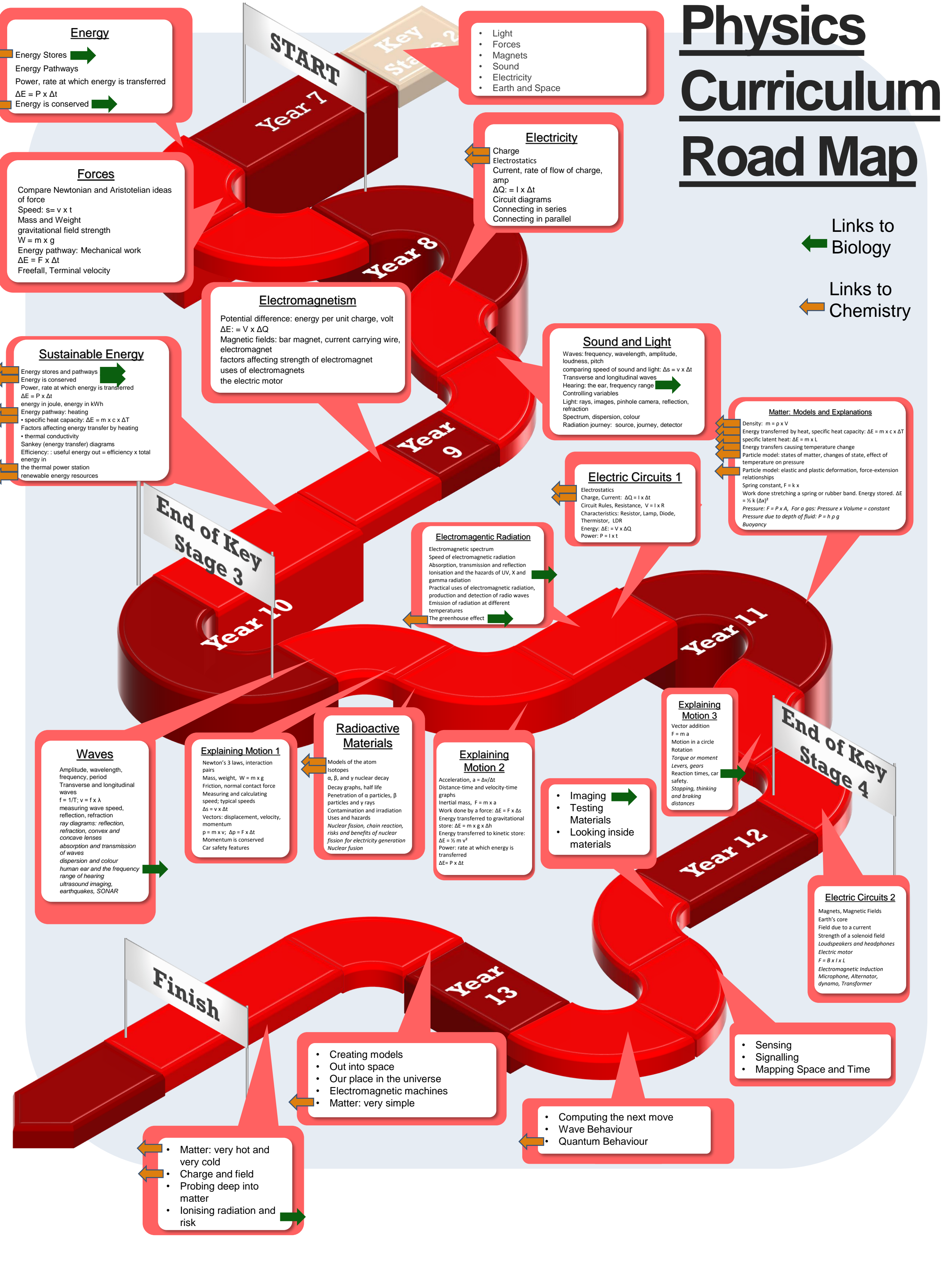
Year 13



# Physics Curriculum Road Map

Links to Biology

Links to Chemistry



**Energy**  
 Energy Stores  
 Energy Pathways  
 Power, rate at which energy is transferred  
 $\Delta E = P \times \Delta t$   
 Energy is conserved

**Forces**  
 Compare Newtonian and Aristotelian ideas of force  
 Speed:  $s = v \times t$   
 Mass and Weight  
 gravitational field strength  
 $W = m \times g$   
 Energy pathway: Mechanical work  
 $\Delta E = F \times \Delta t$   
 Freefall, Terminal velocity

• Light  
 • Forces  
 • Magnets  
 • Sound  
 • Electricity  
 • Earth and Space

**Electricity**  
 Charge  
 Electrostatics  
 Current, rate of flow of charge, amp  
 $\Delta Q = I \times \Delta t$   
 Circuit diagrams  
 Connecting in series  
 Connecting in parallel

**Electromagnetism**  
 Potential difference: energy per unit charge, volt  
 $\Delta E = V \times \Delta Q$   
 Magnetic fields: bar magnet, current carrying wire, electromagnet  
 factors affecting strength of electromagnet  
 uses of electromagnets  
 the electric motor

**Sound and Light**  
 Waves: frequency, wavelength, amplitude, loudness, pitch  
 comparing speed of sound and light:  $\Delta s = v \times \Delta t$   
 Transverse and longitudinal waves  
 Hearing: the ear, frequency range  
 Controlling variables  
 Light: rays, images, pinhole camera, reflection, refraction  
 Spectrum, dispersion, colour  
 Radiation journey: source, journey, detector

**Sustainable Energy**  
 Energy stores and pathways  
 Energy is conserved  
 Power, rate at which energy is transferred  
 $\Delta E = P \times \Delta t$   
 energy in joule, energy in kWh  
 Energy pathway: heating  
 • specific heat capacity:  $\Delta E = m \times c \times \Delta T$   
 Factors affecting energy transfer by heating  
 • thermal conductivity  
 Sankey (energy transfer) diagrams  
 Efficiency: : useful energy out = efficiency x total energy in  
 the thermal power station  
 renewable energy resources

**Matter: Models and Explanations**  
 Density:  $m = \rho \times V$   
 Energy transferred by heat, specific heat capacity:  $\Delta E = m \times c \times \Delta T$   
 specific latent heat:  $\Delta E = m \times L$   
 Energy transfers causing temperature change  
 Particle model: states of matter, changes of state, effect of temperature on pressure  
 Particle model: elastic and plastic deformation, force-extension relationships  
 Spring constant,  $F = k \times x$   
 Work done stretching a spring or rubber band. Energy stored.  $\Delta E = \frac{1}{2} k (\Delta x)^2$   
 Pressure:  $F = P \times A$ , For a gas: Pressure x Volume = constant  
 Pressure due to depth of fluid:  $P = h \times \rho \times g$   
 Buoyancy

**Electric Circuits 1**  
 Electrostatics  
 Charge, Current:  $\Delta Q = I \times \Delta t$   
 Circuit Rules, Resistance,  $V = I \times R$   
 Characteristics: Resistor, Lamp, Diode, Thermistor, LDR  
 Energy:  $\Delta E = V \times \Delta Q$   
 Power:  $P = I \times V$

**Electromagnetic Radiation**  
 Electromagnetic spectrum  
 Speed of electromagnetic radiation  
 Absorption, transmission and reflection  
 Ionisation and the hazards of UV, X and gamma radiation  
 Practical uses of electromagnetic radiation, production and detection of radio waves  
 Emission of radiation at different temperatures  
 The greenhouse effect

**Waves**  
 Amplitude, wavelength, frequency, period  
 Transverse and longitudinal waves  
 $f = 1/T$ ;  $v = f \times \lambda$   
 measuring wave speed, reflection, refraction  
 ray diagrams: reflection, refraction, convex and concave lenses  
 absorption and transmission of waves  
 dispersion and colour  
 human ear and the frequency range of hearing  
 ultrasound imaging, earthquakes, SONAR

**Explaining Motion 1**  
 Newton's 3 laws, interaction pairs  
 Mass, weight,  $W = m \times g$   
 Friction, normal contact force  
 Measuring and calculating speed; typical speeds  
 $\Delta s = v \times \Delta t$   
 Vectors: displacement, velocity, momentum  
 $p = m \times v$ ;  $\Delta p = F \times \Delta t$   
 Momentum is conserved  
 Car safety features

**Radioactive Materials**  
 Models of the atom  
 Isotopes  
 $\alpha$ ,  $\beta$ , and  $\gamma$  nuclear decay  
 Decay graphs, half life  
 Penetration of  $\alpha$  particles,  $\beta$  particles and  $\gamma$  rays  
 Contamination and irradiation  
 Uses and hazards  
 Nuclear fission, chain reaction, risks and benefits of nuclear fission for electricity generation  
 Nuclear fusion

**Explaining Motion 2**  
 Acceleration,  $a = \Delta v / \Delta t$   
 Distance-time and velocity-time graphs  
 Inertial mass,  $F = m \times a$   
 Work done by a force:  $\Delta E = F \times \Delta s$   
 Energy transferred to gravitational store:  $\Delta E = m \times g \times \Delta h$   
 Energy transferred to kinetic store:  $\Delta E = \frac{1}{2} m v^2$   
 Power: rate at which energy is transferred  
 $\Delta E = P \times \Delta t$

**Explaining Motion 3**  
 Vector addition  
 $F = m \times a$   
 Motion in a circle  
 Rotation  
 Torque or moment  
 Levers, gears  
 Reaction times, car safety.  
 Stopping, thinking and braking distances

• Imaging  
 • Testing Materials  
 • Looking inside materials

**Electric Circuits 2**  
 Magnets, Magnetic Fields  
 Earth's core  
 Field due to a current  
 Strength of a solenoid field  
 Loudspeakers and headphones  
 Electric motor  
 $F = B \times I \times L$   
 Electromagnetic Induction  
 Microphone, Alternator, dynamo, Transformer

• Sensing  
 • Signalling  
 • Mapping Space and Time

• Creating models  
 • Out into space  
 • Our place in the universe  
 • Electromagnetic machines  
 • Matter: very simple

• Computing the next move  
 • Wave Behaviour  
 • Quantum Behaviour

• Matter: very hot and very cold  
 • Charge and field  
 • Probing deep into matter  
 • Ionising radiation and risk