Retrieval	**Core Knowledge**	**Student Thinking**
What do teachers need **retrieve** from students before they start teaching **new content**?	What **specific ambitious knowledge** do teachers need teach students in this sequence of learning?	What real life examples can be applied to this sequence of learning to **development of our students thinking, encouraging them to see the inequalities around them** and 'do something about them!'
Y8 Simple Energy Transfers: introduces the eight energy stores and 5 transfer mechanisms. It also introduces the concept of work done being the transfer of energy. Conservation of energy and thermal dissipation is also introduced	**L1:** What are the main energy stores and methods of transfer? There are 8 energy stores: **thermal, kinetic, gravitational potential, elastic potential, chemical, magnetic, electrostatic and nuclear**. Energy is tranferred **mechanically** (by a force), **electrically**(by a current), by heating, by a **chemical reaction** or by **radiation**(waves). **Work done** is another way of saying energy transferred. **L2:** What is Gravitational Potential Energy. Lifing an object in a **gravitational field** requires work. This causes energy to be transferred to the GPE store. Gravitational Potential energy is the amount of energy transferred to this store due to its height above the ground. Gravitational Potential energy depends on the mass of an object, its height above the ground and the acceleration force of gravity. **L3:** How is GPE calculated. *g . p . e . = mass × gravitational field strength × height* $E_p = m\,g\,h$ **gravitational potential energy, E_p, in joules, J mass, m, in kilograms, kg** **gravitational field strength, g, in newtons per kilogram, N/kg (In any calculation the value of the gravitational field strength (g) will be given).** **height, h, in metres, m** **L4:** Core Assessment **L5:** What is is KE and how is it calculated? A moving object has **kinetic energy.** The kinetic energy of a moving object can be calculated using the equation: *kinetic energy = 0.5 × mass × speed^2* $E_k = \frac{1}{2} m v^2$ **kinetic energy, E_k, in joules, J** **mass, m, in kilograms, kg**	Speed limits are in place to reduce the risk of harm to pedestrians. Lower speeds = lower energy transfer on impacts.

	speed, _v_, in metres per second, m/s The amount of kinetic energy is directly proportional to the mass of an object, **L6**: How do you plan an investigation? **Independent variable** is the variable being changed by the experimenter eg height of the ramp. The **dependent variable** is the variable being measured to see the effect of the independent variable eg speed of the car down the ramp. For an experiment results to be valid only one variable should be changed, all other variables must be **controlled** eg mass of the car, distance travelled down the ramp. **L7**: How does the height of a ramp affect the kinetic energy of a car rolling down it? Falling objects or objects rolling down a slope transfer energy from the GPE store to the KE store. If there is **no friction** on the falling/rolling object all of the GPE is transferred to the KE store. **L8**: What is meant by **energy conservation?** Energy can be transferred usefully, stored or **dissipated,** but cannot be created or destroyed. If there is no friction on the falling/rolling object all of the GPE is transferred to the KE store. In reality, there is usually friction due to things like air resistance etc. This means that some of the GPE energy of a falling/rolling object will be transferred to the thermal energy stores of the objects and the surroundings and less will be transferred to the KE store. When energy is transferred to the thermal energy store of the surroundings it is said to have been dissipated.	Careers in rollercoaster development Research into reducing friction using graphene/nanotechnology to improve energy efficiency Falling stars are pieces of rock falling through the earth's atmosphere and heating up due to friction, causing them to burn up. Space craft returning from outer space are falling from a great height and so will reach very high velocities, they have to be designed to withstand the heating effects of friction with the Earths atmosphere. NASA uses teflon (the stuff that covers non-stick saucepans) to make heat shields for space craft.