Home learning activities

Subject
Science
Year Group
Year 7
Unit of work / Knowledge organiser
Energy
Activities

- Complete the 'Knowledge Check' by clicking on the link below (Mr Tobi has also emailed this link out to you):

https://forms.office.com/Pages/ResponsePage.aspx?id=tWaUKrjGMEuM3bZvypd0-1JR5WsjuLFPvbjI4VXu0Y1UQkVYQlgwTThYS0tXVUdaSkcyMlVaRjNWSS4u

- Read through Sections 1-4 of the 'Knowledge Organiser' on 'Energy'.
- Make careful and detailed notes on Sections 1-4, including writing out the 'Energy stores and methods of transfer' in Section 1.
- Write down the 'Symbol Equation' for 'Gravitational potential energy store' without looking at your earlier notes from Section 2.
- Complete the 'Energy Stores' activity, matching up each of the 'Energy Store' boxes with the correct 'Definition' on the right; the answers are provided at the end, but do not look at these until you have tried to complete the work yourself (**be strict with yourself here**).
- Complete the 'Energy Stores and Transfers' questions. Use the mark scheme (**once you have tried the questions**) to mark your answers carefully.

Where do you complete the work?
In Study Books.
What to do if you finish the work? (Extension activity)

- Make sure you have completed the previous set work on 'Atoms, Elements and Compounds – 2' and then work on the 'Mini Project' on 'Energy'.

SMITH'S WOOD ACADEMY

These websites might help:
• BBC Bitesize -> Secondary -> KS3 -> Science -> Physics -> Energy -> Energy stores and transfers
If you are struggling with your work or if you have finished.
Please email your classroom teacher directly using the email list found in the Home Learning section of the website.

Year 7 - Energy

SMITH'S WOOD ACADEMY

Section 1: Energy stores and methods of transfer

1 Chemical store	Energy stored as chemicals waiting to **react.**
2 Kinetic store	Energy stored in objects that **move.**
3 Gravitational Potential store	Energy stored in objects raised up against the force of **gravity.**
4 Elastic Potential store	Energy stored in an object that have been **stretched.**
5 Internal store	Energy stored in the movement of particles. It is a combination of the **kinetic** energy of the particles and the **potential** energy of particles that are apart from each other. Can be modified by **heating** or **cooling**.
6 Nuclear store	Energy stored in the **nuclei** of atoms that can fuse (nuclear fusion) or split (nuclear fission).
7 Magnetic store	Energy stored in **magnets** that are **attracting** or **repelling.**
8 Electrostatic store	Energy stored in **electric charges** that are **attracting** or **repelling**.
9 Mechanical transfer	Energy transferred when a **force moves through a distance**.
10 Electrical transfer	Energy transferred when a **charge moves**.
11 Radiation transfer	Energy transferred by **electromagnetic radiation**.
12 Heat transfer	Energy transferred when an object is **heated.**

Section 2: Equations to learn

Calculation	Equation	Symbol equation	Units
13 Kinetic energy store	Kinetic energy = 0.5 x mass x velocity^2	$E_k = 0.5\ m\ v^2$	Energy – Joules (J) Mass – kilograms (kg) Velocity – metres per second (m/s)
14 Gravitational potential energy store	Gravitational potential energy = mass x gravitational field strength x height	$E_p = m\ g\ h$	Energy – Joules (J) Mass – kilograms (kg) Gravitational field strength – Newtons per kilogram (N/kg) Height – metres (m)
15 Power	Power =energy transferred ÷ time	$P = \frac{E}{t}$	Power – Watts (W) Energy transferred – Joules (J) Time – seconds (s)
16 Power	Power = work done ÷ time	$P = \frac{W}{t}$	Power – Watts (W) Work done – Joules (J) Time – seconds (s)
17 Efficiency	Efficiency = $\frac{\text{useful energy output}}{\text{total energy input}}$		Energy – Joules (J)
18 Efficiency	Efficiency = $\frac{\text{useful power output}}{\text{total power input}}$		Power – Watts (W)

Section 3: Energy Resources

Resource	Renewable?	Uses	Advantages	Disadvantages
19 Fossil Fuels	No	Electricity, transport, heating	**Reliable** – electricity can be generated all of the time. Relatively **cheap** way of generating electricity.	Produces **carbon dioxide**, a greenhouse gas that causes **global warming.** Can produce **sulphur dioxide**, a gas that causes **acid rain**.
20 Nuclear Fuel	No	Electricity	Produces **no carbon dioxide** when generating electricity. **Reliable** – electricity can be generated all of the time.	Produces **nuclear waste** that remains **radioactive** for thousands of years. **Expensive** to build and **decommission** power stations.
21 Bio Fuel	Yes	Heating, electricity	**Carbon neutral**. **Reliable** – electricity can be generated all of the time.	Production of fuel may damage ecosystems and create a **monoculture**.
22 Wind	Yes	Electricity	**No CO_2** produced while generating electricity.	**Unreliable** – may not produce electricity during **low wind**. **Expensive** to construct.
23 Hydroelectricity	Yes	Electricity	**No CO_2** produced while generating electricity.	Blocks rivers stopping **fish migration**. **Unreliable** – may not produce electricity during **droughts**.
24 Geothermal	Yes	Electricity, heating	Does not damage **ecosystems**. **Reliable** source of electricity generation.	Fluids drawn from ground may contain **greenhouse gases** such as **CO_2** and **methane**. These contribute to **global warming**.
25 Tidal	Yes	Electricity	**No CO_2** produced while generating electricity.	**Unreliable** – **tides vary**. May damage **tidal ecosystem** e.g. mudflats.
26 Waves	Yes	Electricity	**No CO_2** produced while generating electricity.	**Unreliable** – may not produce electricity during **calm** seas.
27 Solar	Yes	Electricity, heating	**No CO_2** produced while generating electricity.	**Unreliable** – does not produce electricity at **night**. Limited production on **cloudy** days. **Expensive** to construct.

Section 4: Key terms

28 Dissipation	Energy becoming **spread out** instead of in a concentrated store. "Wasted" energy.
29 Lubrication	A method of reducing unwanted energy transfers by application of a **lubricant** (e.g. **oil**) to **reduce friction**. Occurs in machines.
30 Insulation	A method of reducing energy transfers by the use of **insulators** (non-conductive material). Occurs in buildings.
31 Conservation of energy	The law that states that **energy cannot be created or destroyed**.
32 Specific heat capacity	The energy needed to raise **1kg** of a material by **1°C**.

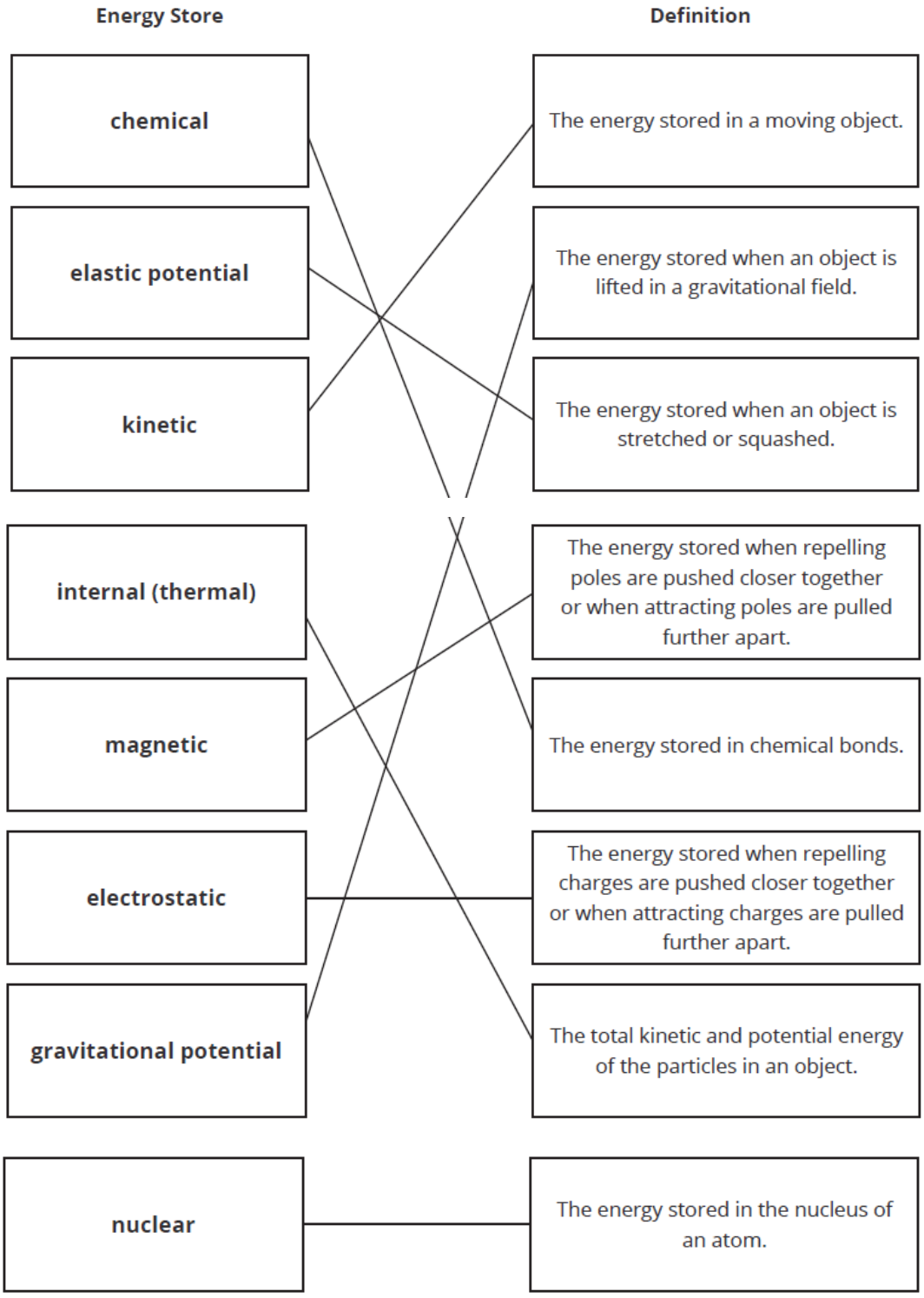
Energy Stores

Draw **one** line from each energy store to its definition.

Energy Store	Definition
chemical	The energy stored in a moving object.
elastic potential	The energy stored when an object is lifted in a gravitational field.
kinetic	The energy stored when an object is stretched or squashed.
internal (thermal)	The energy stored when repelling poles are pushed closer together or when attracting poles are pulled further apart.
magnetic	The energy stored in chemical bonds.
electrostatic	The energy stored when repelling charges are pushed closer together or when attracting charges are pulled further apart.
gravitational potential	The total kinetic and potential energy of the particles in an object.
nuclear	The energy stored in the nucleus of an atom.

Energy Stores **Answers**

Draw **one** line from each energy store to its definition.



Energy Stores and Transfers

1. Describe where each of the energy stores can be found in the picture.

nuclear: _____

gravitational potential: _____

elastic potential: _____

kinetic: _____

magnetic: _____

internal (thermal): _____

chemical: _____

electrostatic: _____

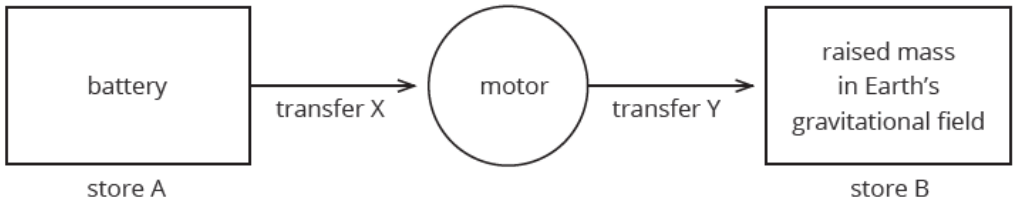
2. As the girl moves down the slide, energy is transferred mechanically to a thermal energy store in the slide.

Name the force that causes this energy transfer.

_____

BEYOND SCIENCE

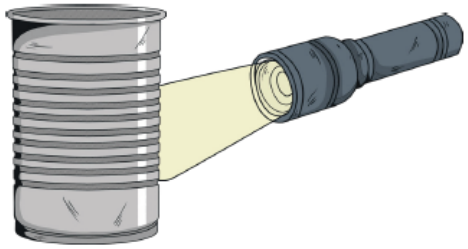
A battery powered motor is used to lift a small mass off the ground. An energy transfer diagram for the system is shown below.



3. Draw **one** line from each label to the way that energy is stored or the pathway by which energy is transferred.

store A	chemical
store B	gravitational
transfer X	kinetic
transfer Y	electrically
	by heating
	mechanically

A battery powered torch is shone on a metal can containing water. The temperature of the water increases.



4. Complete the sentences to describe the energy stores and transfers in the system.

Choose answers from the box. Some words may be used more than once.

chemical	electrically	by heating	by radiation	thermal

Energy is transferred _____ from the _____ energy store in the battery to the bulb, and then _____ to the _____ energy store in the can. Energy is then transferred _____ from this energy store to the _____ energy store of the water.

Energy Stores and Transfers **Answers**

1. Describe where each of the energy stores can be found in the picture.

nuclear: **in the power station**

gravitational potential: **in the children on the slide and the rocking horse**

elastic potential: **in the spring of the horse**

kinetic: **in the moving children and horse**

magnetic: **between the magnet and roundabout**

internal (thermal): **in the children, plants, objects, ground and slide due to friction**

chemical: **in the banana, the muscles of the children and the trees**

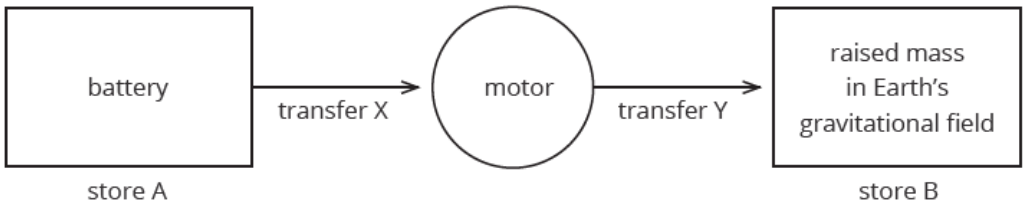
electrostatic: **in the hair of the girl on the slide**

2. As the girl moves down the slide, energy is transferred mechanically to a thermal energy store in the slide.

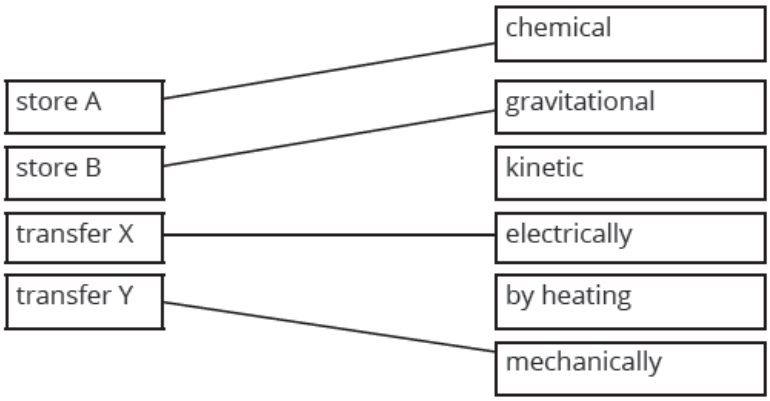
Name the force that causes this energy transfer.

friction

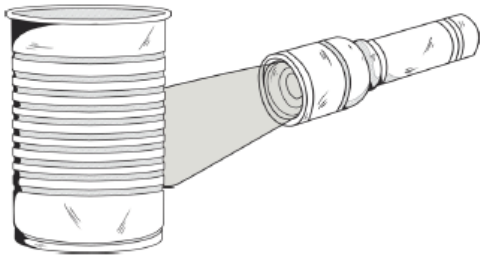
A battery powered motor is used to lift a small mass off the ground. An energy transfer diagram for the system is shown below.



3. Draw **one** line from each label to the way that energy is stored or the pathway by which energy is transferred.



A battery powered torch is shone on a metal can containing water. The temperature of the water increases.



4. Complete the sentences to describe the energy stores and transfers in the system. Choose answers from the box. Some words may be used more than once.

chemical	electrically	by heating	by radiation	thermal

Energy is transferred **electrically** from the **chemical** energy store in the battery to the bulb, and then **by radiation** to the **thermal** energy store in the can. Energy is then transferred **by heating** from this energy store to the **thermal** energy store of the water.

Energy

Watch this video: https://www.youtube.com/watch?v=nbXXFtF8Lzs

https://www.youtube.com/watch?v=z_-BPpmFet8

Task	Description
1	Draw energy transfer diagrams of 5 household items, label fully.
2	Define stored (potential) energy and give examples.
3	Make a table of what you eat in a day, include how many calories each food contains and how many calories you have eaten in total for one day. (May need to look up on internet or on food labels.)
4	Make a table of how many calories different people are recommended to eat each day eg toddlers, teenagers (boys/girls), man/woman, pregnant woman, an older person.
5	Draw diagram(s) of how fossil fuels were made. Label fully.
6	Write a newspaper article on “are fossil fuels contributing to global warming?”
7	Make a board game or card game on energy resources or make a model island with a number of renewable energy resources on it.
8	Read the BBC website article on solar furnaces, http://news.bbc.co.uk/1/hi/sci/tech/6616651.stm
9	Generate a glossary of the keywords from this topic. A glossary is a detailed list of keywords and their meanings or descriptions.