

YEAR 8 SCIENCE ELP

THINK
FUEL
FOCUS
PERFORM

EXPLORE. CREATE. CHALLENGE YOURSELF!

Choose one of the two exciting tasks below to show your curiosity, creativity and love of science!

1 RESEARCH WHICH CHEMICALS ARE COMMONLY FOUND IN ENERGY DRINKS.

Create a report or poster including:

COMMON CHEMICALS AND THEIR EFFECTS

CHEMICAL	EFFECTS IN THE BODY	SAFE AMOUNT (GUIDELINES)
 CAFFEINE	Increases alertness, improves concentration, raises heart rate.	Up to 400 mg per day for adults.
 SUGAR	Quick source of energy, may cause energy crashes, tooth decay.	< 25 g per day (WHO guideline for adults).
 TAURINE	May support heart health and muscle function (evidence is mixed).	No official upper limit, common amount 1,000 mg per drink.
 B VITAMINS (B6, B12)	Help convert food to energy, support brain and nerve function.	Generally safe in small amounts found in drinks.
 GUARANA	Natural source of caffeine, may enhance alertness.	Varies – provides extra caffeine (see total intake).

ALSO CONSIDER...

- ✓ How much of each chemical is safe?
- ✓ Should the energy drink industry have to abide by age limits?
- ✓ Is ethical marketing to young people important? Why or why not?

CHALLENGE YOURSELF

Use facts, graphs, images and your own opinions to create a balanced and persuasive report or poster that makes people think!



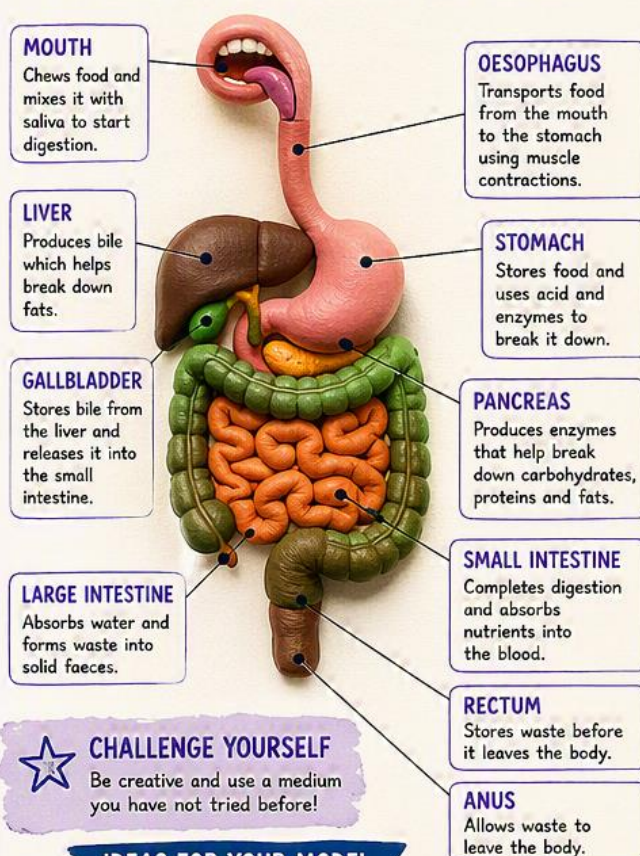
DID YOU KNOW?

Some energy drinks contain as much caffeine as 2-3 cups of coffee!

HAVE YOUR SAY!

2 PRODUCE A MODEL OF THE DIGESTIVE SYSTEM AND LABEL IT WITH THE FUNCTIONS OF EACH ORGAN.

This can be in any medium of your choice.



CHALLENGE YOURSELF

Be creative and use a medium you have not tried before!

IDEAS FOR YOUR MODEL



CLAY



FOAM & FELT



RECYCLED MATERIALS



CARD & PAPER

PLEASE SUBMIT YOUR ELPs TO YOUR SCIENCE TEACHER BY THE **LAST DAY** OF THIS HALF TERM

EVERYDAY CHEMISTRY EVERYWHERE!

YEAR 8

SCIENCE ELP

EXPLORE. CREATE. CHALLENGE YOURSELF!

Choose one of the two exciting tasks below to show your **curiosity**, **creativity** and **love of science**!

1 RESEARCH 3-5 CHEMICAL REACTIONS THAT YOU USE EVERY DAY.

Create a poster summarising:

REACTION	USED FOR	CHEMICALS INVOLVED	END OR EXO?
 COMBUSTION (BURNING)	Cooking food or heating your home.	Methane (CH_4) + Oxygen (O_2) → Carbon dioxide (CO_2) + Water (H_2O)	 EXOTHERMIC (releases heat)
 BAKING BREAD	Makes bread rise and gives it a soft texture.	Baking soda (NaHCO_3) + Acid (in dough) → Carbon dioxide (CO_2) + Water (H_2O)	 EXOTHERMIC (releases heat)
 RUSTING OF IRON	Causes rust on nails, bikes and cars.	Iron (Fe) + Oxygen (O_2) + Water (H_2O) → Iron(III) oxide (rust)	 EXOTHERMIC (releases heat)
 NEUTRALISING ACID	Antacid tablets relieve heartburn and upset stomachs.	Hydrochloric acid (HCl) + Magnesium hydroxide ($\text{Mg}(\text{OH})_2$) → Magnesium chloride (MgCl_2) + Water (H_2O)	 ENDOTHERMIC (absorbs heat)
 PHOTOSYNTHESIS (IN PLANTS)	Plants make their own food and release oxygen.	Carbon dioxide (CO_2) + Water (H_2O) → Glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) + Oxygen (O_2)	 ENDOTHERMIC (absorbs light energy)

THINK ABOUT...

- ✓ Why is the reaction useful in your everyday life?
- ✓ What happens during the reaction?
- ✓ Is the reaction endothermic (takes in energy) or exothermic (releases energy)?

CHALLENGE YOURSELF

Can you find some surprising reactions that happen around you without you even realising?

2 CREATE A POEM OR SONG ABOUT THE ELEMENTS IN THE PERIODIC TABLE.

This can be about a specific element, a group of elements in the table, or the periodic table as a whole.

GET CREATIVE!

POEM

Hydrogen is number one,
Light and simple, lots of fun.
Helium floats up in the air,
Noble and rare beyond compare!

SONG

To the tune of your favourite song!
Sodium, magnesium, aluminium too,
Silicon, phosphorus, sulphur – what about you?
Chlorine, argon, potassium bright,
Calcium, scandium, titanium – what a sight!

Calcium scandium, titanium													He
H													He
Li	Be							B	C	N	O	F	Ne
Na	Mg							Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn		

CHALLENGE YOURSELF

Use scientific facts, rhymes, rhythm and creativity to make your poem or song informative, memorable and fun!

IDEAS TO INSPIRE YOU

 FOCUS ON ONE ELEMENT	 FOCUS ON A GROUP OF ELEMENTS	 TELL THE STORY OF THE WHOLE PERIODIC TABLE	 RAP, SONG, BALLAD OR ANY STYLE!
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YEAR 8 SCIENCE ELP

THINK. EXPLORE. DISCOVER!

EXPLORE. CREATE. CHALLENGE YOURSELF!

Choose one of the two exciting tasks below to show your **curiosity**, **creativity** and **love of science**!

1 RESEARCH MAGLEV TRAINS AND CREATE A POSTER.

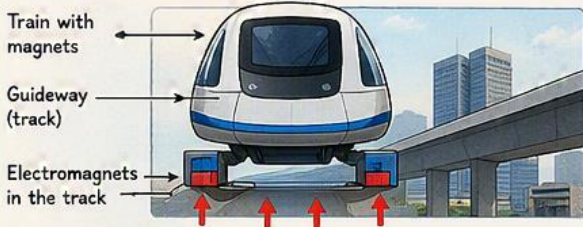
Include images of the trains, how they work and the advantages and disadvantages of these.

WHAT ARE MAGLEV TRAINS?

Maglev (magnetic levitation) trains float above the track using magnets. This means there is no contact or friction, so they are very fast and smooth!



HOW DO THEY WORK?



- 1 Electromagnets in the track repel magnets on the train.
- 2 This lifts the train up and keeps it suspended.
- 3 Other magnets push and pull the train forwards.

ADVANTAGES

- ✓ Very fast (up to 600 km/h+)
- ✓ No friction = less energy lost
- ✓ Quiet and smooth ride
- ✓ Less wear and tear
- ✓ Environmentally friendly (lower emissions)

DISADVANTAGES

- ✗ Very expensive to build
- ✗ Requires special tracks
- ✗ Not widely available
- ✗ High maintenance
- ✗ Needs a lot of space for guideways

CHALLENGE YOURSELF

Compare maglev trains with traditional trains.
What do you think the future of transport looks like?



2 FIND EXAMPLES OF MAGNETIC OBJECTS AND MAGNETS IN YOUR HOME.

Create a report with diagrams or images of the types of materials that are magnetic and where magnets are used in your home.



TYPES OF MATERIALS THAT ARE MAGNETIC



WHERE MAGNETS ARE USED IN YOUR HOME



CHALLENGE YOURSELF

Test different objects with a magnet.
Can you sort them into magnetic and non-magnetic?
Which magnets are the strongest?



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YEAR 8 SCIENCE ELP

BIG IDEAS, BETTER FUTURES!

EXPLORE! DISCOVER! INNOVATE!

EXPLORE. CREATE. CHALLENGE YOURSELF!

Choose **one** of the two exciting tasks below to show your **curiosity**, **creativity** and **love of science**!

1 RESEARCH WHAT GREEN URBANISM IS. USE YOUR RESEARCH TO REDESIGN A PART OF CHESTER INTO A GREEN CITY.

Create a poster of your design with explanations of how your design will make Chester more sustainable.

DESIGN A BETTER CHESTER!

WHAT IS GREEN URBANISM?

Green urbanism is about designing and managing cities to improve quality of life while reducing environmental impact. It creates healthy, sustainable places for people and wildlife.

YOUR REDESIGN - IDEAS TO INCLUDE

GREEN ROOFS

Plants on roofs insulate buildings, reduce energy use and absorb rainwater.

URBAN TREES & GREEN SPACES

Improve air quality, cool the city and support wildlife.

SUSTAINABLE TRANSPORT

More walking, cycling and public transport reduce pollution and traffic.

RAINWATER HARVESTING

Collect and reuse rainwater for gardens, toilets and cleaning.

SOLAR POWER

Use renewable energy to power homes, schools and businesses.

WILDLIFE CORRIDORS

Connect habitats so nature can thrive in the city.

SUSTAINABLE BUILDINGS

Use natural materials, better insulation and energy-efficient designs.

THINGS TO INCLUDE IN YOUR POSTER

- ✓ A map or drawing of the area you are redesigning.
- ✓ Key features of your green city and how they work.
- ✓ How your design helps people, wildlife and the planet.
- ✓ Links to sustainable materials, energy and transport.
- ✓ Why your design makes Chester a better place to live.

BE CREATIVE! USE COLOUR, DIAGRAMS & LABELS!

CHALLENGE YOURSELF

Can you make your design carbon neutral? Could your ideas be used somewhere else in the world? How?

2 PLANT SOME SEEDS AND PUT ONE POT IN THE DARK AND ONE IN THE LIGHT FOR A WEEK.

Record photos or pictures of the plant growth each day.

Create a report to showcase your findings. You may want to include an outline of your method, any variables you controlled, your pictures or photos and any measurements of the plant heights each day.



EXAMPLE RESULTS TABLE

DAY	LIGHT		DARK		Observations
	Photo / Drawing	Height (cm)	Photo / Drawing	Height (cm)	
1		0.5		0.5	Seeds germinated.
2		1.2		1.7	Dark plant is taller.
3		2.0		3.0	Light plant is greener.
4		3.1		4.8	Dark plant is pale.
5		4.3		6.5	Light plant has leaves.
6		5.2		7.2	Dark plant is weak.
7		6.1		7.8	Light plant is healthy & strong.

METHOD OUTLINE

- Put 2 pots with the same type and amount of soil.
- Plant the same number of seeds at the same depth.
- Water both pots equally.
- Place one pot in a light place and one in a completely dark place.
- Measure plant height each day for 7 days.
- Take photos or draw your plants each day.

VARIABLES CONTROLLED

- ✓ Same type and number of seeds
- ✓ Same amount of soil
- ✓ Same size of pots
- ✓ Same amount of water
- ✓ Same temperature
- ✓ Only variable changed = amount of light



THINGS TO INCLUDE IN YOUR REPORT



Photos or drawings each day



Height measurements in a table



Observations and explanations



What you found out



What you would change next time



CHALLENGE YOURSELF

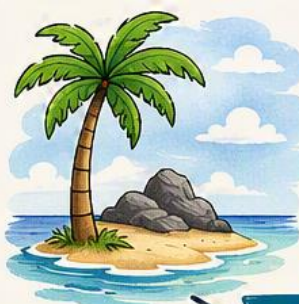
Can you explain why the plants in the dark grew taller but were not as healthy? What does this tell us about light?



DISCLAIMER: Please seek parental permission before carrying out any at home experiments.



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SCIENCE CAN SOLVE REAL-LIFE PROBLEMS!

EXPLORE. CREATE. CHALLENGE YOURSELF!

Choose one of the two exciting tasks below to show your **curiosity**, **creativity** and **love of science**!

1 IMAGINE YOU ARE STRANDED ON A DESERT ISLAND...

How could you use separation techniques to make pure water from the sea water? Create an information leaflet outlining the equipment you could use, what you need to do and what will happen at each stage.



MAKING PURE WATER USING SEPARATION TECHNIQUES

We can use simple separation techniques to separate water from salt and other impurities in sea water.

EQUIPMENT YOU COULD USE:



WHAT YOU NEED TO DO:

- 1 Fill the large pot with sea water.  This is your salt water source.
- 2 Place the small bowl in the centre of the pot. Make sure it does not float.  This will collect the pure water (vapour) later.
- 3 Cover the pot tightly with cling film.  Make sure it is sealed well around the edges.
- 4 Place the rock on top of the cling film directly above the small bowl.  The film will dip down in the middle.
- 5 Put the pot in the sun and wait!  This provides heat for the process.

WHAT WILL HAPPEN?

The sun heats the sea water. Water evaporates and turns to vapour. The vapour rises, hits the cling film, cools down and turns back into liquid. The drops roll down the film and drip into the bowl. Salt and other impurities are left behind in the pot.



★ WHY IS THIS USEFUL?

- ✓ You get pure water to drink.
- ✓ The salt and impurities stay behind.
- ✓ This method uses only simple materials and the sun!

★ CHALLENGE YOURSELF

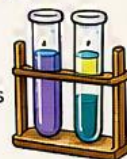
Could you improve this design? Think about making it faster or using other materials you find on the island!



2 CHROMATOGRAPHY AT HOME

Use the method below to separate out coloured substances.

Create a report with photos of your experiments and final chromatograms.

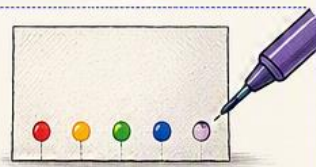


METHOD:

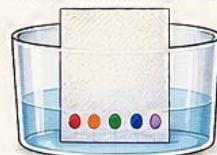
- 1 Take a piece of plain kitchen roll or a coffee filter.



- 2 Add small drops of a coloured substance to the bottom of the paper (these could be food colourings, paints or pens as long as they are water soluble).



- 3 Place the paper in a small amount of water. Make sure the dots on the paper stay above the water at all times.



- 4 Let the water move up the paper until just above the top. You should see the colours moving too and separating out.



- 5 Leave to dry and record your observations.



YOUR REPORT COULD INCLUDE:



PHOTOS OF EACH STAGE



DIAGRAMS OR CHROMATOGRAMS



OBSERVATIONS & RESULTS



CONCLUSIONS & EXPLANATIONS



CHALLENGE YOURSELF

Try different substances and see which gives the clearest separation. Which colours are made from the most others?



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YEAR 8 SCIENCE ELP

THINK
INVESTIGATE
DESIGN
DISCOVER!

SMART HOMES,
WARMER FUTURE!

EXPLORE, CREATE. CHALLENGE YOURSELF!

Choose one of the two exciting tasks below to show your curiosity, creativity and love of science!

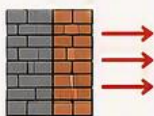
1 RESEARCH INSULATING METHODS IN HOUSES IN THE UK. DESIGN A HOUSE THAT REDUCES HEAT LOSS.

Create a poster of your design explaining how heat loss is prevented linked to conduction, convection and radiation.

HOW HEAT IS LOST FROM HOUSES

CONDUCTION

Heat is lost through materials when it travels from warmer areas to cooler areas.



CONVECTION

Warm air rises and escapes. Cool air comes in to replace it.



RADIATION

Heat is lost through infrared waves through windows, walls and roofs.



INSULATING METHODS IN UK HOMES

ROOF INSULATION

Loft insulation traps warm air and reduces heat loss by conduction and convection.

DOUBLE GLAZING

Trapped air between glass panes reduces heat loss by conduction and convection.

FLOOR INSULATION

Insulation under floors reduces heat loss by conduction.



WALL INSULATION

Cavity wall or solid wall insulation reduces heat loss by conduction.

DRAUGHT PROOFING

Seals around doors, windows and floors stop warm air escaping and cold air coming in.

HEATING & CONTROLS

Efficient boilers and smart thermostats help use energy wisely.

YOUR DESIGN - EXPLAIN YOUR IDEAS!

- ✓ Draw your house design.
- ✓ Label the insulating methods you have used.
- ✓ Explain how your design reduces heat loss through conduction, convection and radiation.
- ✓ Think about materials, layout and renewable energy (e.g. solar panels).
- ✓ How will your design make the house more sustainable?



CHALLENGE YOURSELF

Can your design be energy efficient, comfortable all year round and environmentally friendly? Be creative and realistic!

2 INVESTIGATE WHICH CUP IN YOUR HOUSE IS BEST FOR KEEPING TEA WARM.

Add hot water into different types of mug and see which has the hottest water after 10 minutes.

Create a report of your findings including pictures of your investigation and your suggestions on what features make the best mug. You may also want to design the best mug from your suggestions.



WHAT TO INCLUDE IN YOUR REPORT



PHOTOS OF YOUR INVESTIGATION



METHOD



RESULTS (TABLES & GRAPHS)



CONCLUSIONS



DESIGN YOUR BEST MUG!

METHOD

- 1 Boil water and pour the same amount into different types of mugs.
- 2 Record the starting temperature.
- 3 Wait 10 minutes.
- 4 Measure the temperature of each mug.
- 5 Record your results and compare.



EXAMPLE RESULTS TABLE

MUG TYPE	MATERIAL	START TEMP (°C)	TEMP AFTER 10 MINS (°C)	TEMP LOSS (°C)
Ceramic Mug	Ceramic	90.0	62.0	28.0
Glass Mug	Glass	90.0	47.0	43.0
Stainless Steel Mug	Metal (double wall)	90.0	70.5	19.5
Plastic Travel Mug	Plastic	90.0	65.5	24.5
Vacuum Travel Mug	Metal (vacuum flask)	90.0	78.0	12.0

WHAT MAKES THE BEST MUG?

- ✓ Keeps heat in (good insulation)
- ✓ Has a lid to prevent heat escaping
- ✓ Made from good insulating materials
- ✓ Thick walls
- ✓ Right shape and size



CHALLENGE YOURSELF

Design your ideal mug! Label the features and explain why they will help keep tea hot for as long as possible.



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