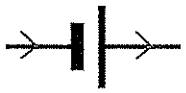
Eight Types of Energy

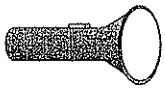
There are *eight* types of *energy*. Make sure you can *recognise* each type and give an *example*.

1) Electrical Energy



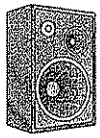
This is a very *useful* form of energy, because it's easily *converted* into other forms — wherever there's a *current flowing*, there's *electrical energy*.

2) Light Energy



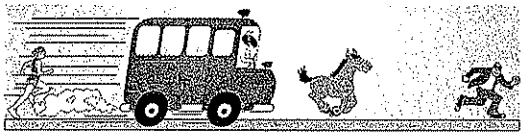

Anything *LUMINOUS* gives off *light energy*,
— things like the Sun, light bulbs and candles... and glow worms.

3) Sound Energy

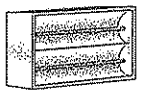
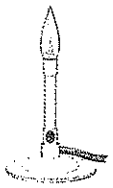

Anything *NOISY* gives off *sound energy*,
— things like vocal chords, speakers and instruments.

4) Kinetic (Movement) Energy



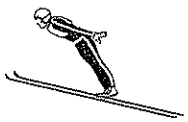
Anything that *MOVES* has *kinetic energy*...

5) Thermal (Heat) Energy

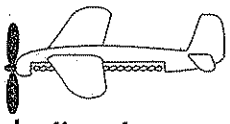
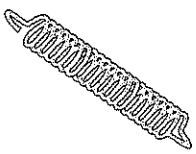
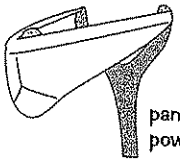
Anything with a temperature *above ABSOLUTE ZERO (-273°C)* has *heat energy* — obviously, that means *everything* has *some* heat energy.
The *hotter* something is — the *more heat energy* it has.

6) Gravitational Potential Energy




Anything that is *ABOVE THE GROUND* has *potential energy*,
— i.e. anything that can fall, like ski jumpers, aeroplanes and climbers.

7) Elastic Energy

Anything *STRETCHED* has *elastic energy*,
— things like rubber bands, springs, knicker elastic, etc.

8) Chemical Energy



Anything with *STORED ENERGY* which can be released by *chemical reaction* — things like food, fuels and batteries.

Heat and Temperature are Different

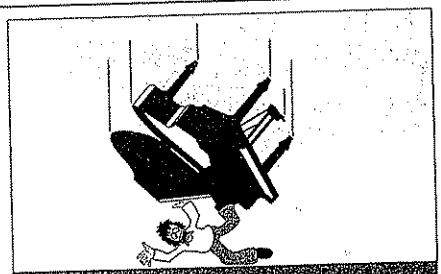
TEMPERATURE is a measure of how *hot* something is — it's measured in *degrees Celsius*, (°C).
HEAT is *NOT* the same thing. Heat is a *form* of *energy* and it's measured in *joules*, (J).
Heat (energy) *flows* between things that have *different temperatures*. Temperature *isn't* a form of *energy* — and temperature *doesn't flow*. When *heat energy flows*, then the *temperature increases* or *decreases*. That's what heat and temperature are all about. It's tricky.

Types of Energy, phew — I'm worn out after all that...

There you are then, eight types of energy to learn, and a confident assertion that there is indeed a difference between heat and temperature. *Learn* the *eight types* then *cover the page* and *write them down*. Make sure you can list *three examples* for each type of energy. Hhhppmmm.

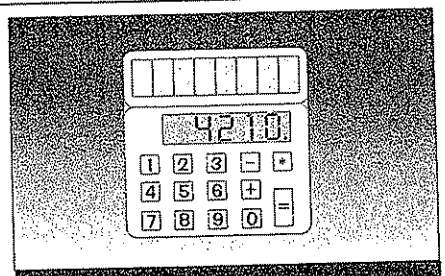
Transfer of Energy

Energy can be Transferred from One Type to Another

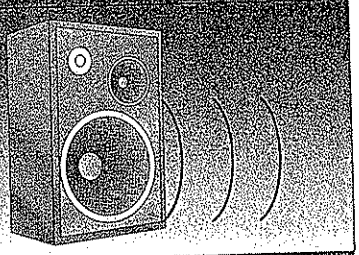


Gravitational → Kinetic

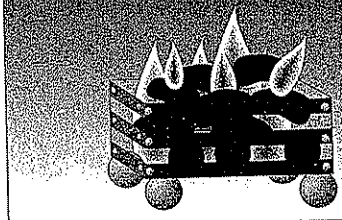
Sound → Electrical



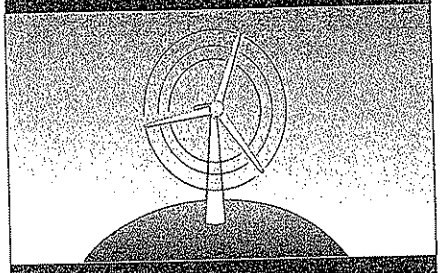
Light → Electrical



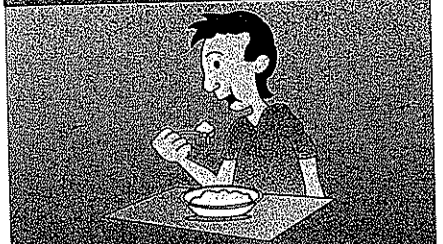
Electrical → Sound



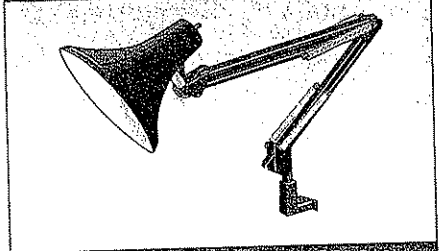
Chemical → Heat, Light



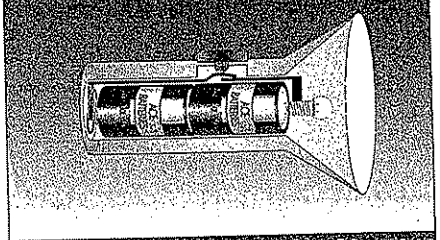
Kinetic → Electrical



Chemical → Heat, Kinetic, Chemical



Electrical → Heat, Light



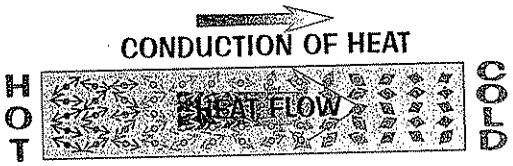
Chemical → Electrical → Heat, Light

Heat is Transferred only if there's a Temperature Difference

Heat can be transferred in *three distinct ways*:

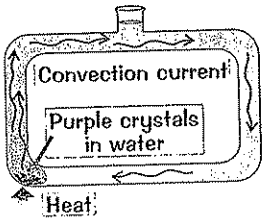
1) Conduction of Heat

This is when *vibrating particles* pass on their *extra* vibrational *energy* to *neighbouring particles*.



2) Convection of Heat

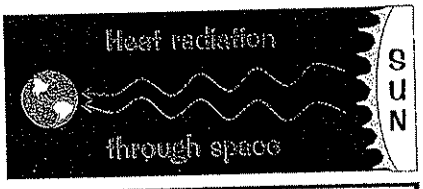
This is when *heated stuff* moves in *bulk* to a *cooler region* and *takes* the heat *with* it.



Purple crystals carried in *convection current*.

3) Radiation of Heat

All hot objects radiate *heat* to the *surroundings* by invisible *heat waves*. This *"heat radiation"* doesn't need *particles* so it means heat can travel across a *vacuum*.



Energy is like The Premier League — it's all transfers...

"*Energy transfers*" are where energy *changes* from *one form* into *another*. This always involves some kind of "device". Be sure to *learn* the nine examples above really well. "*Transfer of heat*" on the other hand, is how *heat moves* from one place to another. There's a subtle difference.

Energy Resources

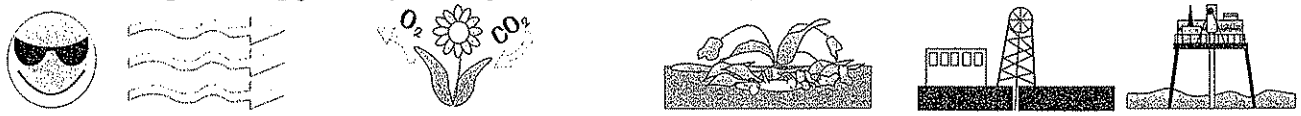
The Sun is the Source of All these Energy Resources

Most of the *energy* around us *originates* from the *Sun*. The Sun's *energy* reaches Earth and is *converted* into *many forms* which we then *convert* (or "use") to *supply* our *energy demands*.

Learn these Six Energy Transfer Chains

1) Sun's Energy → Coal, Oil, and Gas (Fossil Fuels)

Sun → *light energy* → *photosynthesis* → *dead plants/animals* → *FOSSIL FUELS*

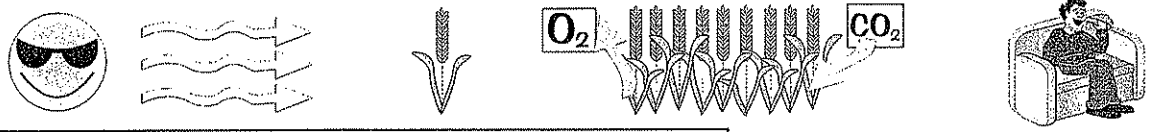


2) Sun's Energy → Wood (Biomass)

Sun → *light energy* → *plants* → *photosynthesis* → *BIOMASS (wood)*

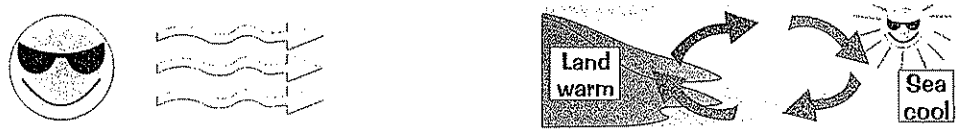
3) Sun's Energy → Food

Sun → *light energy* → *plants* → *photosynthesis* → *BIOMASS (food)*



4) Sun's Energy → Wind Power

Sun → *heats atmosphere* → *causes WINDS*

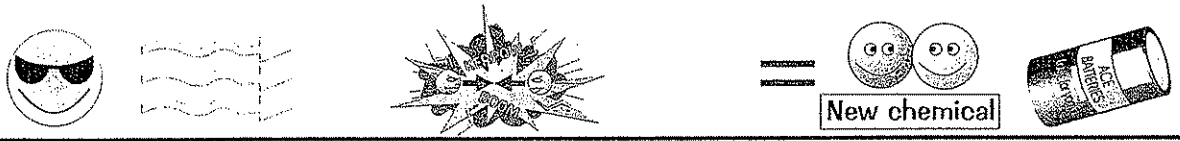


5) Sun's Energy → Wave Power

Sun → *heats atmosphere* → *causes WINDS* → *causing WAVES*.

6) Sun's Energy → Batteries

Sun → *heats world* → *causes CHEMICAL REACTIONS* → *making CHEMICAL BATTERIES.*

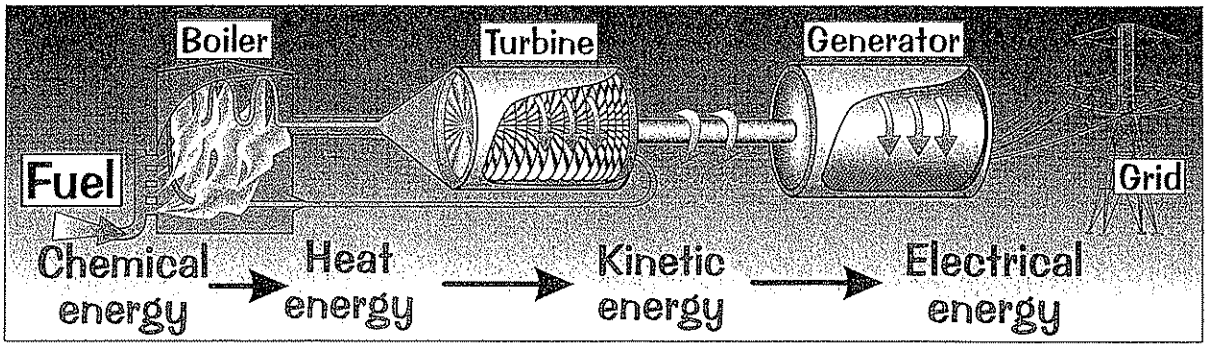


All that free energy — how long till they privatise it...

They're pretty hot on "Sun's energy" Exam questions.
They want you to be fully aware that pretty well *all* our energy comes originally from the *Sun* — that's what those six *energy transfer chains* show. *Learn them*.

Generating Electricity

Power Stations Generate Electricity for the Whole Nation



1) *Fuels* like coal, oil and natural gas are *burnt* in the *boiler* which releases heat energy. *Petrol* is definitely *not burnt* in power stations — it would be *too* expensive. *Oil* is.
2) This is used to heat up *water* which then changes to *high pressure steam*.
3) The steam is then used to drive huge *turbines* which are just like really big *fans*.
4) These *turbines* are attached to a *generator*, which spins round like a big *dynamo*.
5) This makes the *electricity*, which is then fed onto the *national grid* and out to our homes where it powers our T.V.s, trainsets etc. It also supplies a lot of *industries*.

Non-renewable Energy Resources WILL RUN OUT

1) *Fossil fuels* took *millions* of years to come about — and only take *minutes* to burn.
2) Once they've been *taken* from the Earth — that's it, they're *gone*, (unless you're gonna to wait around a few more million years for more to be made).
3) There'll come a *time* when we *can't find* any *more* and then we could have a *problem*.
4) The thing is *crude oil* is vital for making all sorts of useful *plastics* and *medicines* so it's not necessarily such a good idea to keep *burning* it. The *ANSWER* is:

i) *SAVE ENERGY* (e.g. turn lights off, drive cars with spacky little engines, etc.).
ii) *USE MORE RENEWABLES*. Energy resources like *wind power*, *biomass*, *wave power*, *solar power*, *tidal power*, *hydroelectric power*, and *geothermal power* are all renewable.

Renewable Energy Resources WON'T RUN OUT

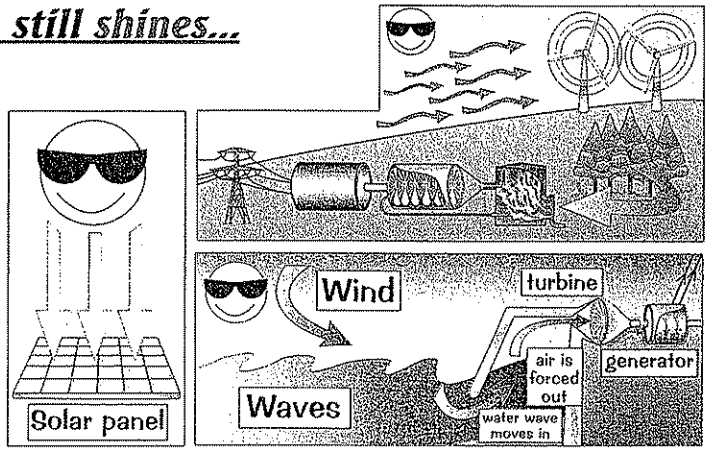
....as long as the Sun still shines...

1) The wind will always blow
— and turn *turbines* to generate electricity.

2) Plants will always grow
— and can be *burnt* to release heat energy.

3) Waves will always be made
— and *drive generators* to make electricity.

4) Solar Cells will always work
— and change light to *electrical energy*.



Think on pal — this'll affect all your generation...

Don't call renewable energy resources "*re-usable*" — no no no no no. They're *not* re-usable, they're *RENEWABLE*. They will *renew* themselves, like trees will grow again if replanted, etc. But once a tree is burnt you can't *re-use* that particular tree. Learn all the facts real good. ☺

Conservation of Energy

Scientists have only been studying energy for about two or three hundred years so far, and in that short space of time they've already come up with nearly two *"Pretty Important Principles"* relating to energy. *Learn* them *really well*:

THE PRINCIPLE OF CONSERVATION OF ENERGY

Energy can never be *CREATED* nor *DESTROYED* — it's only ever *CONVERTED* from one form to another.

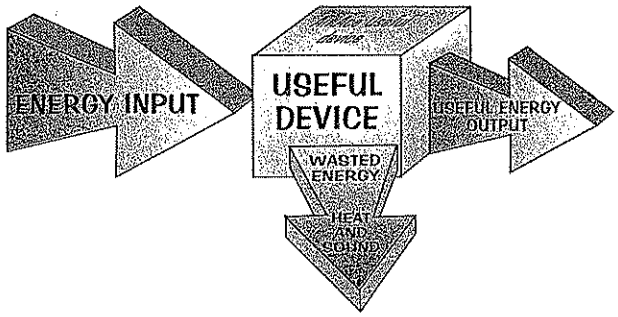
That means energy never simply *disappears* — it always *converts* into another form. This is another *very useful principle*:

Energy is *ONLY USEFUL* when it's *CONVERTED* from one form to another.

Think about it — all *useful machines* use *one kind* of energy and *give out* another.

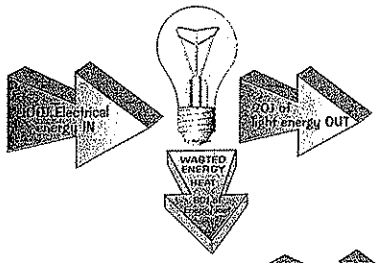
Most Energy Transfers are Not Perfect

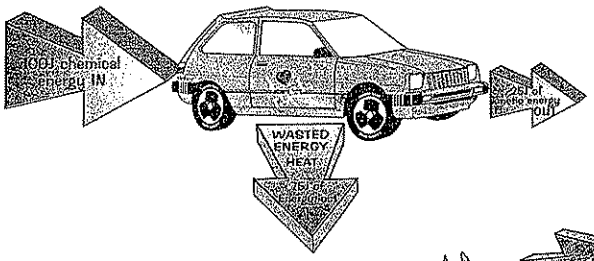
1) Useful devices are *useful* because they *convert energy* from *one form* to *another*.
2) *Some energy* is always *lost* in some way, nearly always as *heat*.
3) As the diagram shows, the *energy input* will always end up coming out partly as *useful energy* and partly as *wasted energy* — but *no energy is destroyed*:

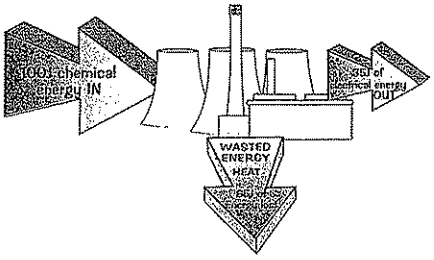


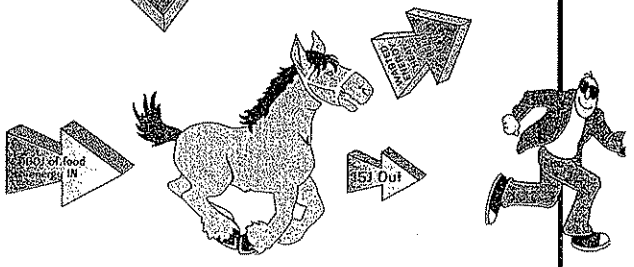
Total Energy INPUT = The USEFUL Energy + The WASTED Energy

Four Very Serious Examples









I've said it so many times now — it's making me horse...

Remember, energy is *never lost completely* — if you think you've lost some, you can bet your bottom dollar it'll have *leaked away* as something less useful — i.e. *heat or sound*.

Energy is *very strange* — it swirls around you every day of your life, it comes in many, many different forms, and you can *never see it* — only the *effects* of it. It's just like *REVISION*.