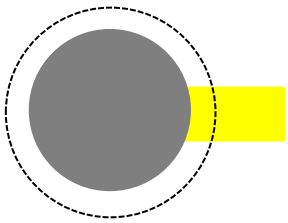
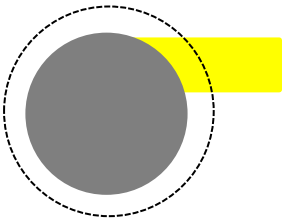
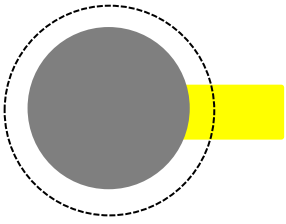
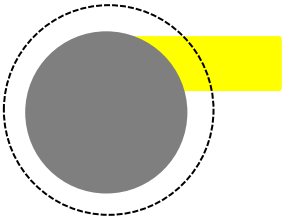
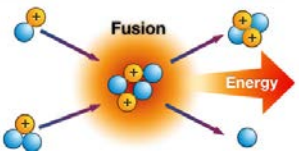
Heat transfer occurring when two objects at different temperatures are in contact with each other.	Heat transfer by mass motion of a fluid such as air or water (hot fluid expands, become less dense and rises)	Heat energy is transmitted through space (vacuum) and Earth's atmosphere by_____	Heat flows from the ___ to the____ object until they are both at the same temperature
Conduction	Convection	Radiation	Warmer Cooler
On or relating to the earth / dry land	The liquid water component of the Earth (oceans, seas lakes, rivers etc)	Layer of gases surrounding Earth (or any planet)	Solid portion of the earth (distinguished from atmosphere, hydrosphere)
Terrestrial	Hydrosphere	Atmosphere	Geosphere
Biological component of earth systems / part of the earth's crust, waters, and atmosphere that supports life	Nuclear reaction / radioactive decay process in which the nucleus of an atom splits into smaller parts (lighter nuclei).	Nuclear reaction in which two or more atomic nuclei come very close, collide at a very high speed and join to form a new nucleus.	An oscillation accompanied by a transfer of energy that travels through space or mass
Biosphere	Fission	Fusion	Wave
The distance over which the wave's shape repeats	The number of waves produced by a source each second	The transmission of energy by electromagnetic waves	Around 10% of the Earth is covered by
Wavelength	Frequency	Radiation	Polar ice

Polar ice act as a reflector of heat due to its high reflective ability	Acts like huge mirrors reflecting back a lot of heat energy from the sun	..... Absorb more energy than polar ice as less reflective	Reflectivity of radiation leads to maintaining a temperature balance
Albedo effect	Polar ice	Dark oceans	Ice albedo
Amount of heat required to raise the temperature of an object or substance one degree	Reduction of the reflective ability of the Earth (diminishing polar ice caps) will lead to	Earth is heated by the sun releasing energy by ___ ___ reactions	Reaction where two small atoms combine to form a larger element and release energy ($E = mc^2$) Is called
Heat capacity	An increase in Earth's temperature (over time)	Nuclear fusion	Nuclear fusion
Nuclear fusion reactions of the sun convert __ into __	Type of radiation absorbed by Earth's surface making it hotter	Heat energy is transferred from Earth' s surface to atmosphere by	Angle of tilt of Earth
Hydrogen Helium	IR / infrared	Conduction	23.5°
Tilt of the Earth's poles to/away from Sun creates....	In ___ heat energy from the Sun is spread over a smaller area so land is heated more	In ___ heat energy from the Sun is spread over a larger area so land is heated less	The ___ of Earth leads to uneven heating of land surface
Seasons	Summer	Winter	Tilt

Vibrating hotter particles passing on their heat energy to the cooler particles next to them by ...	Cold ground & still, trapped air above, are conditions needed for the formation of...	Normally air temp. decreases the higher you are from the ground, as _____ makes the hot and cold air particles mix	An increase in air temperature with height for a variable distance from the ground occurs in
Conduction	An inversion layer	Convection / convection currents	An inversion layer
Air particles trapped in lower cooler layer can form	Acts as a "ceiling / trap" to convection currents	Earth's core is heated by unstable heavy elements undergoing....	Heat transfer from core to outer core to mantle occurs by....
Smog / air pollution	Inversion layer	Nuclear fission	Conduction
Slowly moving viscous liquid 'layer' of Earth's structure	When particles spread out and rise a liquid or gas becomes....	Water heated due to contact with hot magma can form a __ _____	Heat transfer from mantle to the crust occurs by....
Mantle	Less dense	Hot spring	Conduction and convection
Can cause a drop in mean temperature of the earth due to ash cloud	Dust in atmosphere from a volcanic eruption will reflect/trap solar _____ from reaching earth surface	A __ __ moves heated water up to a hot spring on the surface and the cycling effect moves cooler water down	Gases like CO_2 and SO_2 and CH_4 are examples of ___ ___
Large volcanic eruption	Radiation	Convection current	Greenhouse gases

Gases that allow heat from the sun to be transmitted to the Earth's surface but do not allow the re-radiated heat from the Earth's surface to be reflected back into space	True or false? Volcanic eruption will eject enough CO_2 and SO_2 into the air to cause an overall appreciable difference in the amounts of both of these gases in the atmosphere	True or false? Heavy ash particles have a greater effect than dust-sized particles (from volcanic eruption) in reflecting the Sun's radiation	Amount of gases emitted from volcano { will / will not } affect the Earth's temperature
Greenhouse gases (CO_2, H_2O, CH_4)	False	False	Will not (small amount overall)
Tiny ash particles from a volcano will remain longer in the {upper / lower}part of the atmosphere	The Gulf Stream originates close to the ____	The Gulf Stream heads {North / South} and acts as a conveyer belt of fast-moving warm water.	Greater area to heat up due to Earth's curvature AND more atmosphere to pass through at the ___
Upper	Equator	North	Poles
Ocean currents influence climate – warmer if air has blown over warm waters of the __ __	atmosphere at equator 	atmosphere at pole 	Smaller area to heat up as Earth is less curved AND less atmosphere to pass through at the ___
Gulf stream	Less atmosphere for Sun's rays to pass through	More atmosphere for Sun's rays to pass through	Equator
Dark / matt surfaces are better ____ (and ___) of radiation	area being heated at equator 	area being heated at pole 	Watery illusion or shimmer effect due to light bending slightly as it moves between differing air densities
Absorbers / emitters	Smaller area to heat up at equator	Larger area to heat up at the pole	Mirage

Light / shiny surfaces are better _____ of radiation	Light / shiny surfaces are poorer _____ of radiation	Hot air is less _____ than cool air and so it rises	If the light hits the hot air at a shallow enough angle, _____ occurs and it is seen as a watery illusion or shimmer (mirage)
Reflectors	Emitters	Dense	TIR (total internal reflection)
Big fluffy clouds (in lower atmos.) {decrease / increase} Earth's albedo by increasing solar reflection	High wispy clouds (in upper atmos.) Transmit __wave radiation but reflect __wave radiation radiated by earth	Big fluffy clouds (in _____ atmos.) Cause localised cooling / lower surface temperatures	High wispy clouds (in _____ atmos.) Cause a rise in temperature
Increase	Short Long	Lower	Upper
Low clouds. Often thick Reflect much of the incoming shortwave IR radiation Being hotter they emit more longwave IR	High clouds. Usually thin and wispy Reflect little of incoming shortwave IR radiation Being cooler they emit less longwave IR back	Visible mass of condensed droplets or frozen crystals floating in atmosphere above the Earth's surface	Heat released by ___ of water vapour to form clouds is radiated into space
Low clouds tend to have a net cooling effect	High clouds tend to have a net cooling effect	Cloud	Condensation
Radiant light and heat (energy) from the Sun	 Process occurring in the ___	Deuterium + tritium → helium + neutron + ENERGY	ROYGBIV Red orange yellow green blue indigo violet
Solar	Sun	Nuclear fusion in the Sun	Colours in white light

Colour of light with longest wavelength λ	Colour of light with shortest wavelength λ	the smaller the wavelength of light, the {greater / less } the scattering of the light by gas molecules in the atmosphere	Blue light is scattered {more / less} than red light by gas molecules in the atmosphere
red	blue	greater	more
Within the visible range of light, ___ light waves are scattered the least by atmospheric gas molecules and __ the most.	At sunrise / sunset the sun is low in the sky and so sunlight travels a _____ path through the atmosphere to reach our eyes	At sunrise / sunset blue light has been mostly removed so we see mainly _____ light remaining	Tiny gas molecules scatter the blue light in all directions which is why we see the sky as _____
red blue	longer	red, orange and yellow	blue
Higher frequency (blues) (_____ λ) are absorbed more than lower frequency (reds) (_____ λ)	The interaction of sunlight with matter can result in one of three wave behaviours	Gas molecules O_2 and N_2 are _____ than the wavelength of visible light.	Scattering of light by molecules much smaller than the wavelength of light is known as
shorter longer	absorption transmission reflection	smaller	Rayleigh scattering