IGCSE Double Science Year 1 Plans

Hello Everyone! Welcome to Year 1 of IGCSE Double Science. This is a two year course and you can join us at any time! This shows what we will be covering this year.

You may see topics appearing more than once, this is to give us chance to revise as we go through and spend some extra time on those more tricky topics. The practical experiments are entirely optional but a lot of fun so join in with any that you can, but don't worry if you can't as I will demo everything and there will be alternative tasks to complete in the lessons.

The after lesson questions are designed to consolidate and extend your learning or give you something to research, but also give you something to write down from the lesson so that you don't have to worry during the lesson. It is of course up to you if you take notes during the lesson or not and please feel free to take screen shots to look at again.

See you in lesson!

Emma

Year	Week	Week Beginning Date	Topic	Title	What you need	After lesson question
1	1	8th Sept	Biology	Diffusion	food colouring and water at different temperatures	Describe and explain the findings of your experiment. How does diffusion link to living things?
1	2	15th Sept	Biology	Lungs	large bottle (2 or 3 l), washing up bowl half full of water, access to tap, straw, measuring jug	Why do plants not have lungs. Explain in as much detail as you can.
1	3	22nd Sept	Biology	Reflexes	A long ruler, someone to help you, a table or arm of a chair	what factors could affect your reaction time? Design an experiment to test this.

1	4	29th Sept	Biology	Carbon Cycle	plasticine and/or small models of animals, plants, mushrooms, bugs, dinosaurs etc, big lump of plasticine, water, blue food colouring, paper straw, paper, scissors, coloured pens/pencils, large jar, marker pen, masking tape.	Explain what can be done to reduce carbon emissions.
1	5	6th Oct	Chemistry	Acids and alkalis	Red cabbage, pestle and mortar or heavy pan and wooden spoon, hot water or access to hob, chopping board, knife, sieve or collander, glasses or clear plastic cups (at least 5), water, soap, washing powder, lemon juice, vinegar, baking powder, bubble bath….. (any clear(ish) liquids to test)	Why is acid rain a problem?
1	6	13th Oct	Chemistry	Neutral	vinegar, baking powder, food colouring, small bottle or sports bottle, hot water (I suggest doing this outside as it gets messy)	What are other examples of neutralisation reactions?
1	7	20th Oct	Chemistry	Corrosion	4 steel nails, 4 jars (with lids), water, oil, salt, packet of desiccant that comes with new shoes etc (if you have any, don't worry if not)	Research how to protect metals from corrosion and look at the use of the method in industry.

1	8	27th Oct	Chemistry	Bonding	sweets (some large some small), cocktail sticks, paper or tray, string or strawberry laces.	Draw diagrams to show the different types of bonding and describe the differences.
1	9	3rd Nov	Physics	Speed	Nothing specific	What is the difference between speed and velocity?
1	10	10th Nov	Physics	Motion and gravity	plasticine or blue tac, string, ruler, skewer or pencil, two chairs back to back or two blocks, lego towers anything you can swing a pendulum through, timer	Describe and explain what you found out from our experiment.
1	11	17th Nov	Physics	Pressure and gravity	2 x large plastic bottle, screw or nail (to make holes in the one bottle, you may need some help with this), water, big plastic box or outside space.	Explain why a deep sea diver might find harder to breathe when very deep in the sea.
1	12	24th Nov	Physics	Stretching forces	Strawberry laces, rainbow laces, any other strap like sweet () 2 small clamps (like the ones on the top of a clipboard), if you don't have clamps strong hairclips or pegs will work, string, small plastic bottle, water, kitchen scales if you have them, ruler.	Draw a graph to show how your different sweets/sweet combinations stretched.
1	13	1st Dec	Biology	Biological molecules	Coloured pens and paper	Describe the difference between a protein and a carbohydrate.

1	14	8th Dec	Biology	Testing for the biological molecules	Nothing needed	Describe how to carry out a test that could be used to see if there is starch in a leaf. What result would you expect and why? Describe how to carry out a test that could be used to see if there is protein in someones saliva. What result would you expect and why?
1	15	15th Dec	Biology	Selective breeding	Nothing needed	Describe the steps involved in selective breeding.
1		22nd Dec HOLIDAY				
1		29th Dec HOLIDAY				
1	16	5th Jan	Chemistry	Moles and molar ratio	kitchen scales, dried pasta, lentils, peas etc, ruler.	A student dissolves 5.0 g NaCl (Mr 58.5) in water. a) Calculate moles. b) If fully reacts in a 1:1 ratio with $AgNO_3$, how many moles of AgCl? Extension: What mass of AgCl forms (Mr 143.5)?
1	17	12th Jan	Chemistry	Acids and Alkalis	Nothing needed	Why doesn't adding twice the acid always halve the pH? Write ionic equation for neutralisation and explain spectator ions.
1	18	19th Jan	Chemistry	Rates of reaction	effervescent tablets, hot water, cold water, timer	How does a catalyst increase rate without being used up? Sketch and label a rate graph for 'chip size' change.

1	19	26th Jan	Chemistry	Exothermic and endothermic reactions	bicarbonate of soda, water, washing powder, water, citric acid, yeast, hydrogen peroxide, calcium chloride, vinegar, thin plastic cups or metal cups for best results. Test tubes would also be great if you have them.	Draw an energy profile for an exothermic reaction and label Ea and ΔH. Why do some endothermic processes feel cold?
1	20	2nd Feb	Physics	Circuits	Nothing required but you may like to access this circuit simulation. https://phet.colorado.edu/sims/html/circuit-construction-kit-dc/latest/circuit-construction-kit-dc_all.html	Why does adding a second identical bulb in series make both dimmer? What changes for parallel? Explain qualitatively using current splits.
1	21	9th Feb	Physics	Circuits	Nothing required but you may like to access this circuit simulation. https://phet.colorado.edu/sims/html/circuit-construction-kit-dc/latest/circuit-construction-kit-dc_all.html	A 6 V source powers two equal resistors in parallel. How does current compare in each branch? What happens to total current if a third branch is added?
1	22	16th Feb	Physics	Resistance graphs	Nothing required	What condition must remain constant for Ohm's law to hold? Why does a filament lamp's resistance increase as it gets hotter?
1	23	23rd Feb	Physics	Domestic electricity plugs and hazards	a plug (old one from an appliance, disconnected), screwdriver	Why must fuses be rated just above device current? Explain how the earth wire prevents electric shock in metal-cased appliances.

1	24	2nd March	Biology	The kidney and excretion	Nothing required	Why is urea produced and how is it removed? What would happen if kidneys failed to reabsorb glucose?
1	25	9th March	Biology	Nervous system	paper clip, a helper	Why are reflexes so fast? Give one example where hormonal control is preferable to nervous control.
1	26	16th March	Biology	Punnet squares	A coin, pen and paper	Two heterozygous parents (Tt × Tt): predict genotype and phenotype ratios. How can a trait skip a generation?
1	27	23rd March	Biology	DNA analysis	Nothing needed	How can a single base substitution change a protein, or not change it at all? Explain the role of mRNA vs tRNA.
1		30th March HOLIDAY				
1		6th April HOLIDAY				
1	28	13th April	Chemistry	Chromatography	Glass, water, coffee filter or paper towel, washable felt pens, scissors, skewer, paper clip, ruler.	Two dyes have same Rf in water; how could you separate them? Why pencil, not pen, for the baseline?
1	29	20th April	Chemistry	Transition metal reactions and catalysts.	Some metal objects to look at, epsom salts, vitamin tablets, nappy rash cream, anti dandruff shampoo (all just to look at- we will be looking for metal compounds)	Why are many transition metal compounds coloured while Group 1 salts are not? Give two reasons copper is used in wiring.
1	30	27th April	Chemistry	Reactivity	steel wool or pan scrubber, aluminium	Explain why carbon can extract zinc from zinc oxide but not

					foil, 2 glasses or jars, vinegar.	aluminum from aluminum oxide. What drives displacement reactions? (electron transfer)
1	31	4th May	Chemistry	Rock to metal	3 steel nails, nail varnish, paint, salt, water, lego bricks or coloured pens and paper.	Why is aluminum extracted by electrolysis but iron by carbon? Suggest two ways to reduce environmental impact of metal extraction.
1	32	11th May	Physics	Sound	bowl, cling film, rice, speaker or music player (phone will work), rubber bands, sturdy square or rectangle lunchbox or butter tub.	Why can't sound travel in space? How does doubling frequency affect pitch?
1	33	18th May	Physics	Energy	nothing needed	Identify starting/ending energy stores for a swinging pendulum. Where is energy 'lost'? (as heating to surroundings)
1	34	25th May	Physics	Energy usage	nothing needed	A bulb takes 60 J and outputs 9 J as light. Calculate efficiency. Suggest two improvements for a fridge's efficiency.
1	35	1st June	Physics	Energy resources	nothing needed	Why do countries still use non-renewables despite climate goals? What makes solar/wind output intermittent?
1	36	8th June	Biology	Habitat survey	small sweets, beads, raisins, rice grains, anything similar, tape, matchsticks or coctail sticks, a few	Why random sampling? Predict how a drought might shift

					sheets of paper or card.	species distribution in your quadrat.
1	37	15th June	Biology	Feeding relationships	some food items or pictures of food items, paper, pens.	Why do top predators have small populations? Sketch a pyramid of biomass for grass → rabbit → fox.
1	38	22nd June	Biology	Human effects	nothing needed	How does deforestation affect the carbon cycle? Why is nitrogen fixation crucial despite nitrogen making up ~78% of air?
1	39	29th June	Biology	Environmental impact and action	Pens and paper	Which personal change would most reduce your environmental impact and why? How do plastics harm marine food webs?
1	40	6th July	Chemistry	Potable water	coffee filter, muddy water, boiled water (hot, be careful) metal spoon.	How does chlorination make water safe, and what are its drawbacks? Explain why filtration alone doesn't make water potable.
1	41	13th July	Chemistry	Compounds	Nothing needed	Describe the limestone cycle and one use of calcium carbonate. How do power stations reduce SO_2 emissions?