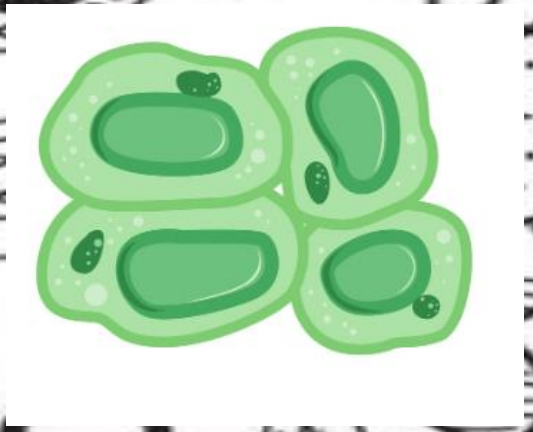
Biology



Be clear on what you need to study (see overleaf)

Plan your revision

- Go through the RAG sheets and identify anything you have rated red, start your revision here
- Practise past papers
- Link key ideas
- Keep up to date with science in the news – they like to ask questions in context

Useful websites

WJEC blended learning

GCSE Pod

BBC Bitesize Biology

Physics & Maths Tutor

Be clear on what you need to study

At grades A*/A pupils need to be proficient in every subject area

The Year 11 biology course covers **higher tier learners must:**

Classification and biodiversity

- the principles of capture/recapture techniques including simple calculations on estimated population size

DNA and inheritance

- there are four types of base, A (adenine), T(thymine), C (cytosine) and G (guanine)
- the role of the triplet code during protein synthesis

Variation and evolution

- understand variation being continuous or discontinuous

Response and regulation

- know the components of a reflex arc: stimulus, receptor, coordinator and effector; be able to label a diagram of a reflex arc to show: receptor, sensory neurone, relay neurone in spinal cord, motor neurone, effector and synapses
- understand the principles of negative feedback mechanisms to maintain optimum conditions inside the body as illustrated by the control of blood glucose levels by insulin and glucagon and by the control of body temperature

Kidneys and homeostasis

- the structure of a nephron and its associated blood supply to show: capillary knot, Bowman's capsule, tubule, collecting duct, capillary network, arteriole to and from capillary knot and be able to label these on a diagram
- understand why the level of substances present in the filtrate changes as it passes through the kidney; the process of filtration under pressure; the selective reabsorption of glucose, some salts and much of the water
- the role of anti-diuretic hormone (ADH)
- understand how a kidney dialysis machine works

Disease, defence and treatment

- understand the fact that a vaccine contains antigens derived from a disease-causing organism; how a vaccine will protect against infection by that organism, by stimulating the lymphocytes to produce antibodies to that antigen; how vaccines may be produced which protect against bacteria and viruses
- understand how after an antigen has been encountered, memory cells remain in the body and antibodies are produced very quickly if the same antigen is encountered a second time; how this memory provides immunity following a natural infection and after vaccination; the highly specific nature of this response
- how monoclonal antibodies are produced from activated lymphocytes which are able to divide continuously, this produces very large numbers of identical antibodies, specific to one antigen (p) the medical uses of monoclonal antibodies including:
  - diagnosis of diseases including Chlamydia and HIV
  - monitoring the spread of malaria
  - tissue typing for transplants
  - supporting chemotherapy for cancers

Chemistry

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The Year 11 chemistry course covers **higher tier learners must:**

Bonding, structure and properties

- understand the possible risks associated with the use of nano-scale particles of silver and titanium dioxide, and of potential future developments in nanoscience

Acids bases and salts

- carry out calculations involving solution volumes and concentrations
- understand neutralisation as the reaction of hydrogen ions with hydroxide ions to form water $H^+(aq) + OH^-(aq) \rightarrow H_2O(l)$ – understand titration as a method to prepare solutions of soluble salts and to determine relative and actual concentrations of solutions of acids/alkalis
- calculate the concentration of a solution in mol dm^{-3}
-understand calculations involving neutralisation reactions in solution, using a balanced chemical equation

Metals and their extraction

- be able to link these ideas to calculation work and ratios in reacting masses.
- understand the identification of Cu^{2+}, Fe^{2+} and Fe^{3+} ions by their precipitation reactions with aqueous OH^-
- understand the electrolysis of aqueous solutions involving competing ions such as sodium chloride (including electrode equations)
- understand the use of electrolysis in electroplating, purification of copper and the manufacture of sodium hydroxide (and hydrogen gas and chlorine gas)

Crude oil, fuels and organic chemistry

- understand the concept of isomerism. isomerism in more complex alkanes and alkenes
- be able to the name more complex alkanes and alkenes positional isomerism
- understand the use of infrared spectroscopy to identify the presence of certain bonds in organic molecules thereby indicating whether they may be alkanes, alkenes, alcohols or carboxylic acids

Reversible reactions, industrial processes and important chemicals

-analyse data relating to factors affecting yields of reversible reactions and understand resulting commercial decisionshe factors involved in choosing conditions to ensure the most economical production of ammonia (Le Chatelier's principle not required)

Physics

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Newton's Laws

- The ability to combine all 3 of Newton's laws in order to answer a question describing how the motion of an object changes, including both quantitative and qualitative information.
- Understand that heavier objects have a greater terminal velocity because it takes longer for air resistance to balance their weight

Work and Energy

- Link together Work done equation with Newton's Laws
- Link together all 4 energy equations to answer questions about how the energy of a moving object changes
- Re-arrange Kinetic energy equation to calculate velocity
- Know the connection between the Hooke's Law experiment and the energy stored in a spring.

Further Motion

- Application of XUVAT equations in calculations about the movement of objects
- Use law of conservation of momentum to calculate the velocity of objects before and after collisions
- Use Kinetic energy equation to determine if a collision is elastic or inelastic.

Stars and Planets + The Universe

- Use HR diagram to describe the life cycle of a star, including changes to temperature, size and luminosity
- Explain how absorption spectra occur and what the tell us about the composition of a star.
- Describe the origins of the Big Bang Theory for the start of the universe – From an explanation of cosmological red shift, through to how this suggests that the universe is expanding, through to how this led to the big bang theory, as well as the presence of CMBR

Radiation, Nuclear Decay and Half Life

- Producing and balancing nuclear equations for radioactive decay using the symbols 4 2+ 2He or 4 2α for the alpha particle and 0 1e − and 0 −1β for the beta particle respectively
- More complex calculations of half life and % of a substance remaining, without the use of half life curves.
- The different uses of radioactive materials, relating to the half-life, penetrating power and biological effects of the radiation e.g. radioactive tracers and cancer treatment
- use data to produce and balance nuclear equations for nuclear fission and fusion
- the problems of containment in fission and fusion reactors including neutron and gamma shielding and pressure containment in fission reactors and maintaining a high temperature in fusion reactors

Be clear on what you need to study

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The Year 11 Physics course covers **higher tier learners must:**

Double Science

Be clear on what you need to study (see overleaf)

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- understand how after an antigen has been encountered, memory cells remain in the body and antibodies are produced very quickly if the same antigen is encountered a second time; how this memory provides immunity following a natural infection and after vaccination; the highly specific nature of this response

Physics

- rearrange equations
- to understand that y = mx + c represents a linear relationship
- to understand the physical significance of the area between a curve and the x-axis and to measure it by counting squares as appropriate

Distance , speed and acceleration- calculate distance travelled from a graph

Newton's laws- state Newton's first, second and third laws

Work and energy
- to understand the physical significance of the area between a curve and the x-axis and to measure it by counting squares as appropriate

the equations for kinetic energy and changes in gravitational potential energy

$$\text{kinetic energy} = \frac{\text{mass} \times \text{velocity}^2}{2}; \quad KE = \frac{1}{2}mv^2$$

$$\text{change in potential energy} = \text{mass} \times \text{gravitational field strength} \times \text{change in height}; \quad PE = mgh$$

- work done in stretching by finding the area under the force (F-x) graph

$W = \frac{1}{2}Fx$ for a linear relationship

Stars and Planets
- understand the Hertzsprung-Russell (H-R) diagram as a means of displaying the properties of stars, depicting the evolutionary path of a star

Chemistry

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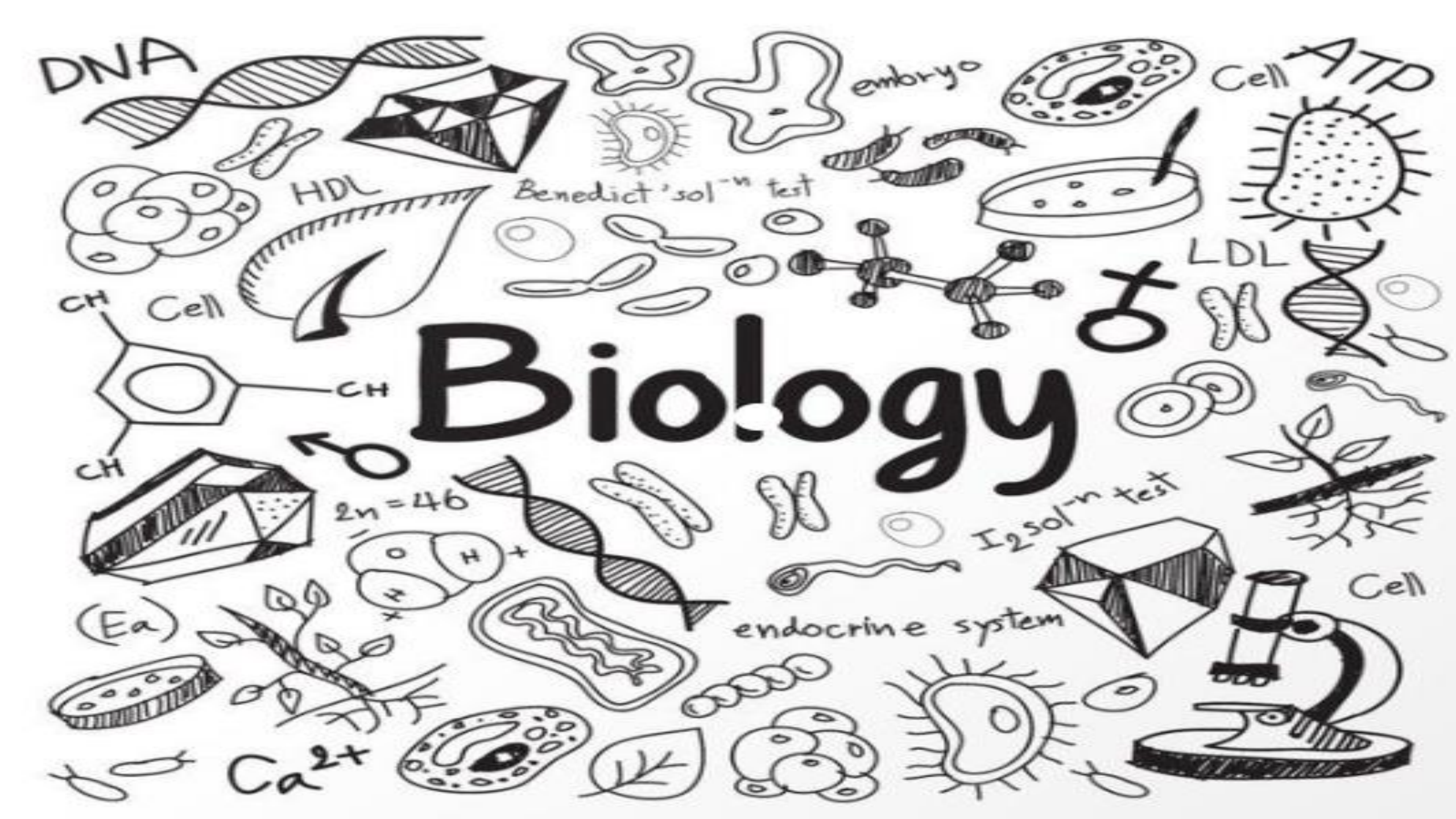
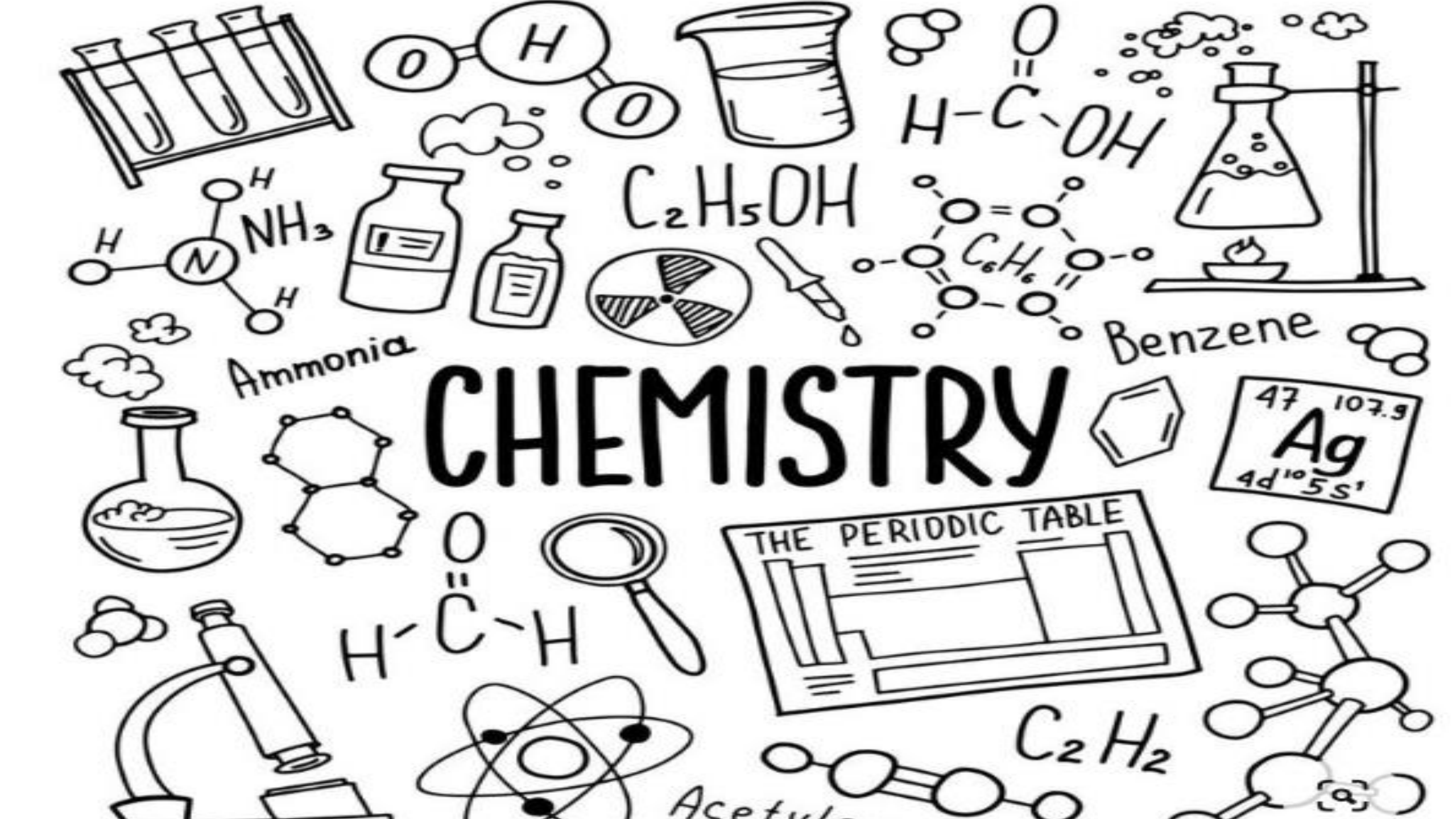
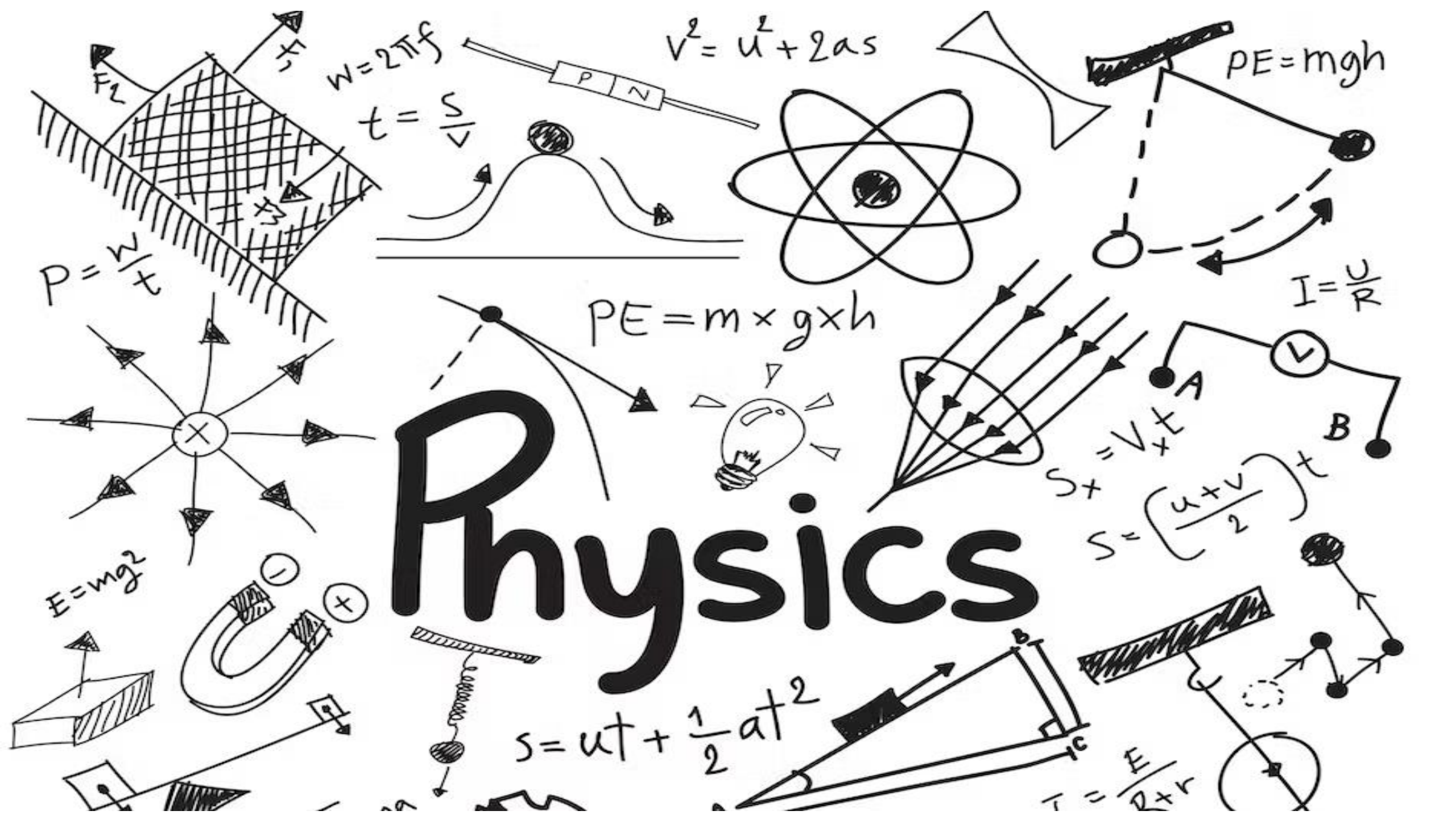

DNA
embryo
Cell
ATP
HDL
Benedict's sol^{-n} test
LDL
CH
Cell
CH
CH
Biology
2n = 46
I_2 sol^{-n} test
Cell
(Ea)
endocrine system
Ca^{2+}


CHEMISTRY
Ammonia
Benzene
THE PERIODIC TABLE
47
107.9
Ag
4d10 5s1


Physics
$w = 2\pi f$
$t = \frac{s}{v}$
$v^2 = u^2 + 2as$
$PE = mgh$
$P = \frac{w}{t}$
$PE = m \times g \times h$
$I = \frac{U}{R}$
$s = ut + \frac{1}{2}at^2$
$s = \left(\frac{u+v}{2}\right)t$
$s_x = v_x t$
$E = mg^2$
$T = \frac{E}{R+r}$
A
B
C
D
V


E=mc2
2+2
SCIENCE