



	Particles 	Waves 	Materials & mechanics 	Electricity 
Y12 topics	Model of atom Unstable nuclei Neutrinos Anti-particles Interactions Classification Quarks Photoelectric effect Energy levels Wave-particle duality	Types of waves Stationary waves Diffraction Refraction Interference	Scalars & vectors Moments Motion Projectiles Newton's laws Momentum Work & power Conservation laws Bulk properties Young's modulus	Current & voltage Resistivity Circuits Potential divider EMF Internal resistance
Links to GCSE	Structure of the atom Atomic nucleus Electromagnetic spectrum	Diffraction Interference Refraction Types of waves	Speed and velocity Acceleration Motion graphs Newton's laws Moments Work done Kinetic energy potential energy Power Hooke's law	Electrical current Voltage/potential difference Ohm's law Circuit diagrams Resistance

	Further mechanics & thermal physics 	Fields and their consequences 	Nuclear physics 	Astrophysics 
Y13 topics	Circular motion SHM Forced vibration Resonance Thermal energy Ideal gases Kinetic theory	Electric fields Gravitational fields Newton's laws Orbits Coulomb's law Electric potential Capacitance Magnetic fields Moving charges Magnetic flux Alternating current Transformers	Rutherford scattering α , β & γ radiation Radioactive decay Nuclear instability Nuclear radius Mass & energy Induced fission Nuclear safety	Telescopes & CCD Star classification Black body radiation HR diagram Supernovae Neutron stars Black holes Cosmology Doppler effect Hubble's law Quasars Exoplanets

Links to GCSE	Circular motion Specific heat capacity Heat transfer	Transformers ac & dc Magnetic fields Charge	Rutherford expt α , β & γ radiation Decay equations Half life Fission Nuclear risks	Life of a star Fission Doppler effect Red shift Lenses
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What can I use to help me prepare for A-level?

- GCSE revision guides - use to ensure you have the foundation knowledge needed.
- CGP 'Head Start to Physics' book – perfect for bridging the gap between GCSE and A-level knowledge. Can be bought online for approximately £5.
- AQA website <http://www.aqa.org.uk/subjects/science/as-and-a-level/physics-7407-7408> – if you want to find out more about what you'll be studying and how you will be assessed.

Useful Websites

Though not an exhaustive list, these are some of the websites which you might find useful.

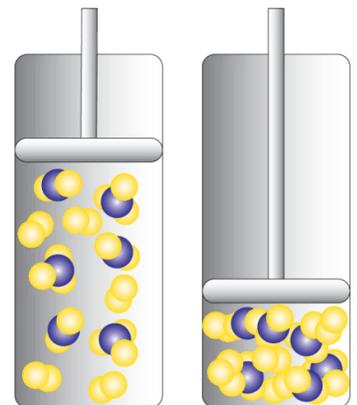
- <http://www.s-cool.co.uk/a-level/physics> - Revision website.
- <http://www.physicsandmathstutor.com/> - Revision website.
- <http://hyperphysics.phy-astr.gsu.edu/hbase/hph.html> - Revision website.
- <http://www.revisionworld.com/a2-level-level-revision/physics-level-revision> - Revision website.
- <http://www.revisiontime.com/aPhys.htm> - List of useful web links for particular topics.
- http://examstutor.com/resources/apprevision/physics_app.php - Smart phone application. Tests with instant feedback and revision support.

Independent Study Task

Mathematical skills are crucial to success in A-level Physics. This task will help you practise these skills.

You need to complete the questions below relating to Boyle's law and gases. These questions are the similar to those you will have encountered during GCSE, if you need extra guidance refer to your GCSE revision guide or one of the websites above.

Gases under pressure exert pressure due to collisions between the particles of the gas and the walls of the container



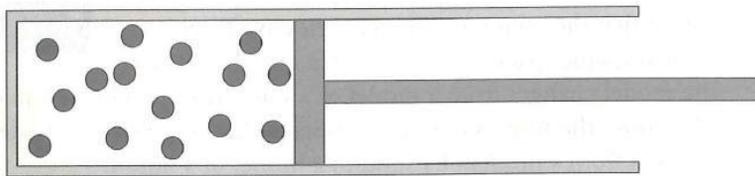
Compressing a gas increases the rate of collisions (they happen more often) so the pressure is increased

For a fixed mass of gas at a constant temperature, the pressure is inversely proportional to the volume. This is known as Boyle's law and can be written as:

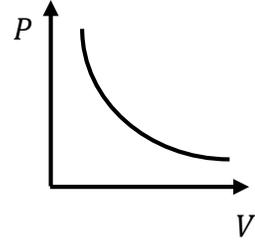
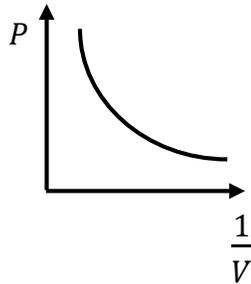
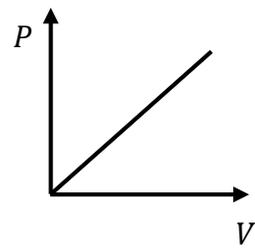
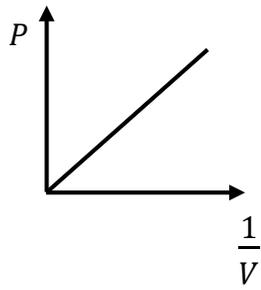
$$p \propto \frac{1}{V} \quad \text{or} \quad pV = \text{constant} \quad \text{or} \quad p_1V_1 = p_2V_2$$

1. The pressure of a sample of gas in a sealed container is changed with the temperature remaining the same. Copy the correct statement?
 - A. If pressure is doubled, the volume also doubles
 - B. If pressure is halved, the volume also doubles
 - C. If pressure is halved, the volume is also halved
 - D. If pressure is doubled, the volume reduces to a quarter

2. The diagram represents the particles in a sample of air inside a sealed syringe.



- a. Copy the diagram and add arrows to show how the particles could be moving.
The piston is now pulled out so that the gas occupies double the original volume.
 - b. Draw a second diagram to show the effect this has on the particles or describe any changes to the particle arrangement or movement.
 - c. What effect does this have on the pressure of the air?
3. A sample of gas is at atmospheric pressure (100 000 Pa) and has volume 50cm^3
 - a. Determine the new pressure if the volume is halved.
 - b. Determine the new pressure if the volume is doubled.
 - c. Determine the new pressure if the volume is decreased to 35cm^3 .
 - d. Determine the new volume if the pressure is reduced to 78 000 Pa.
 4. Circle the two graphs below that could represent the relationship between pressure and volume (for a fixed mass of gas at constant temperature).



5. Copy and complete:

For a fixed _____ of gas at constant _____, the pressure of a gas increases as the _____ of its container _____.

6. Copy and complete:

P_1	V_1	P_2	V_2
100 000 Pa	5 m ³	50 000 Pa	
100 000 Pa	2 m ³	400 000 Pa	
250 000 Pa		450 000	1 m ³
1.2 x 10 ⁵ Pa	10 m ³	6.0 x 10 ⁵ Pa	
100 kPa	240 cm ³		150 cm ³

Extension:

7. A carbon dioxide gas cylinder contains 180cm³ of gas at a pressure of 6.3 x 10⁶ Pa.

a. Calculate the volume of the gas at atmospheric pressure, 1.0 x 10⁵ Pa.

The cylinder valve is opened and the gas is collected at atmospheric pressure.

b. Explain why less gas would be collected than the answer to a.?

Carbon dioxide does not liquefy when put under pressure. Butane gas (used in camping gas cylinders) does liquefy.

- c. Explain how the cylinders used to store carbon dioxide would be different from those used to store butane (camping gas).

The answers to these questions should be handed in during your first Physics lesson.