TOPIC 6: MATTER

Heating

- Particle vibrate about a fixed position in a solid
- Particles freely move about in a gas

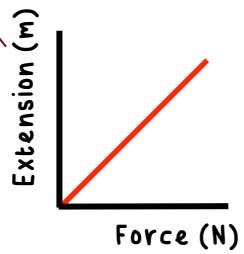
Pressure

- Force/area
- Particles are in constant random motion
  - Collisions transfer momentum
    - Rate of change of momentum = force exerted
      - Heating increases pressure
- Increased temperature = increased kinetic energy = increased movement

Density

- Mass/volume

Stress

- When multiple forces act on a body
  - Compression
  - Tension
  - Torsion
- Hooke's law
  - F=kx
    - Applies up to elastic limit
      - 

    - Plastic deformation
      - Object does not retain its original shape
  - When work is done on a spring, it stores elastic potential energy
    - $W = \frac{1}{2}kx^2$

OCR (B)

TOPIC 6: MATTER: ENERGY

Internal Energy

- Kinetic and potential energy
  - Heating increases internal energy of a system
    - Change of state
      - Mass is always conserved
      - Sublimation
      - Evaporation
    - Increase in temperature

Specific Latent Heat

- The amount of energy needed to change the state of a substance without changing temperature
- E=mL
- Fusion
  - Change between solid/liquid
- Vaporisation
  - Change between liquid/gas

Specific Heat Capacity

- $E = mc\Delta T$
- The amount of energy needed to raise the temperature of 1kg of a substance by 1°C
- Experimental determination
  - Electrical heater
  - Thermometer

OCR (B)

TOPIC 6: MATTER: THE BIG BANG

Evidence

- Red shift
  - A perceived increase in wavelength
  - Universe is expanding as distant galaxies are moving away
- CMBR = cosmic microwave background radiation
  - Short wavelength radiation produced by universe as it cools
  - Present in all directions
- Universe expanded from a single point

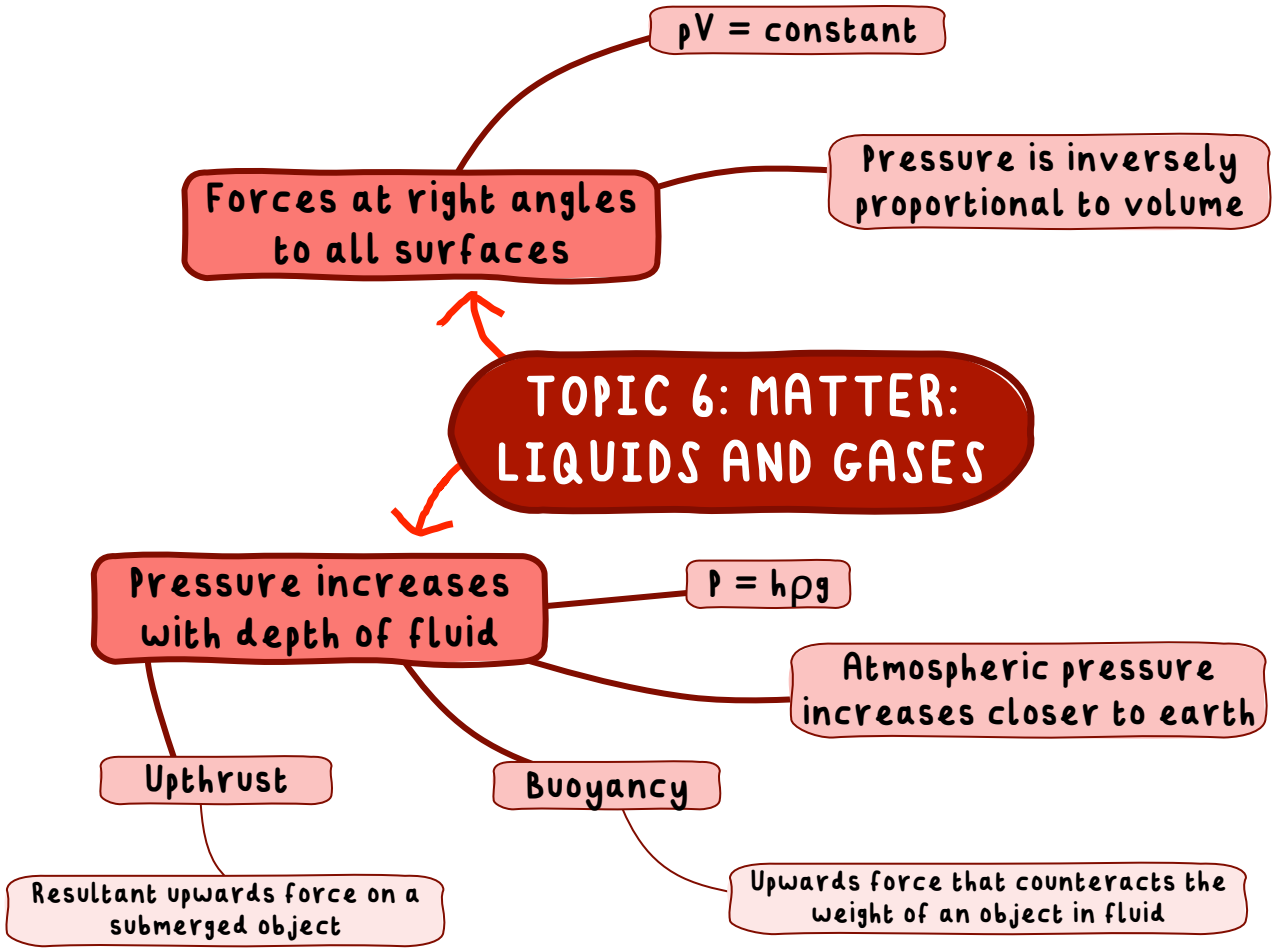
Solar System

- Heliocentric
  - Eight planets (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune)
  - Gravitational force acts between planets and sun
  - Elliptical orbit
- Clouds of gas and cosmic dust, pulled together by gravity
  - Gas compression
  - Hydrogen nuclei fuse, forming helium nuclei + energy
  - $W = pV$

Stars

- Formation of stars
- Equilibrium between pressure and gravity = stable star
- Death of a star
- Star runs of nuclear fuel
- Star collapses under its own inward pressure

OCR (B)



OCR (B)