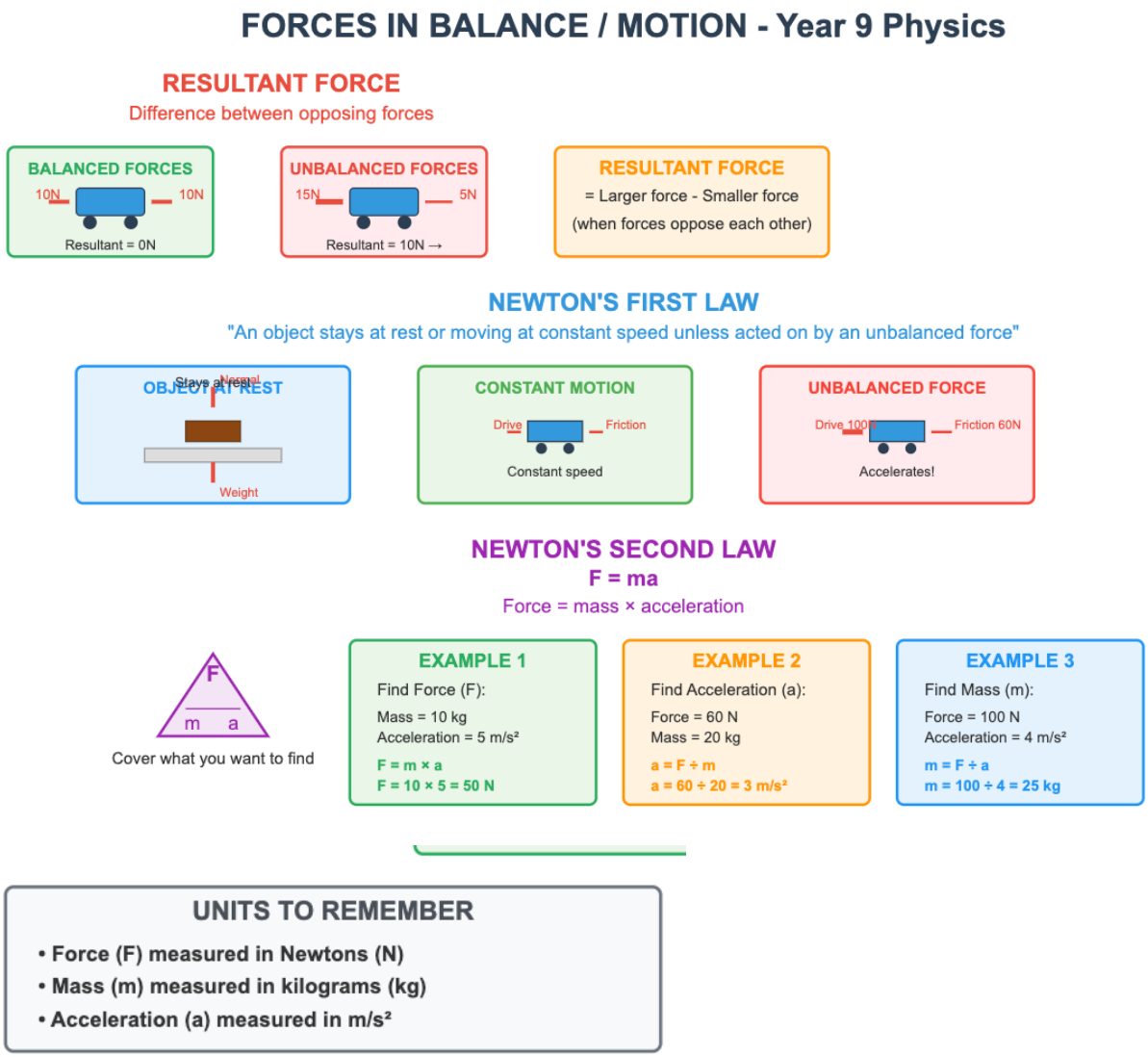
Year 9 Science Revision Summary - Bolingbroke Academy

This revision guide covers the core science topics from the Year 9 curriculum across Biology, Chemistry, and Physics, broken down by term. It is designed to support exam preparation by focusing on key content, diagrams, and formulas likely to appear in end-of-year assessments.

Physics: Forces Predict Motion

7. Forces in Balance / Motion - Resultant force = difference between opposing forces - Newton's First Law (object stays at rest/moving unless acted on) - Newton's Second Law: (F = ma) (Force = mass x acceleration)



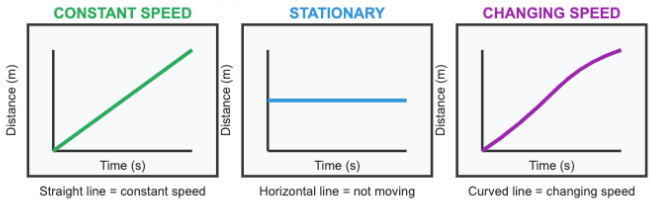
More force = more acceleration (if mass stays same) • **More mass** = less acceleration (if force stays same) • **Zero resultant force** = no acceleration YEAR 9 EXAM TIPS ✓ **Resultant force = 0:** balanced forces, no acceleration ✓ **Always show working** for F=ma calculations ✓ **Use the triangle method** to rearrange F=ma ✓ **Include correct units** in your final answers

8. Interpreting Graphs of Motion - Distance-time graph: slope = speed - Velocity-time graph: slope = acceleration; area = distance

INTERPRETING GRAPHS OF MOTION - Year 9 Physics

DISTANCE-TIME GRAPHS

SLOPE = SPEED



CALCULATING SPEED

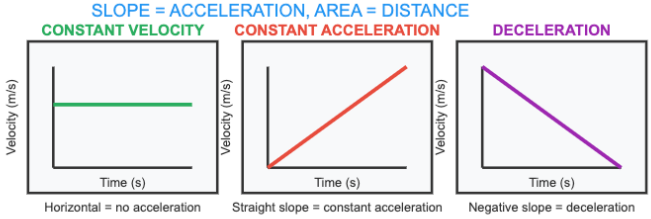
Speed = slope of line

Speed = distance ÷ time

Example:
Distance = 60m, Time = 20s
Speed = 60 ÷ 20 = 3 m/s

VELOCITY-TIME GRAPHS

SLOPE = ACCELERATION, AREA = DISTANCE



CALCULATIONS

Acceleration = slope
$a = (v_2 - v_1) \div \text{time}$

Distance = area under line
For rectangle: length × width
For triangle: ½ × base × height

WORKED EXAMPLES

DISTANCE-TIME EXAMPLE

A car travels 120m in 40 seconds.

What is its speed?

Speed = distance ÷ time
Speed = 120 ÷ 40 = 3 m/s
The slope of the line = 3 m/s

VELOCITY-TIME EXAMPLE

A bike accelerates from 0 to 15 m/s in 5 seconds.

Find: (a) acceleration (b) distance travelled

(a) Acceleration = (15-0) ÷ 5 = 3 m/s²
(b) Distance = ½ × base × height
Distance = ½ × 5 × 15 = 37.5 m

AREA = DISTANCE

Constant velocity of 10 m/s for 6 seconds

Area under line = distance travelled

Rectangle area = length × width
Distance = 6 × 10 = 60 m
This works for any shape under the line!

KEY DIFFERENCES FOR EXAM

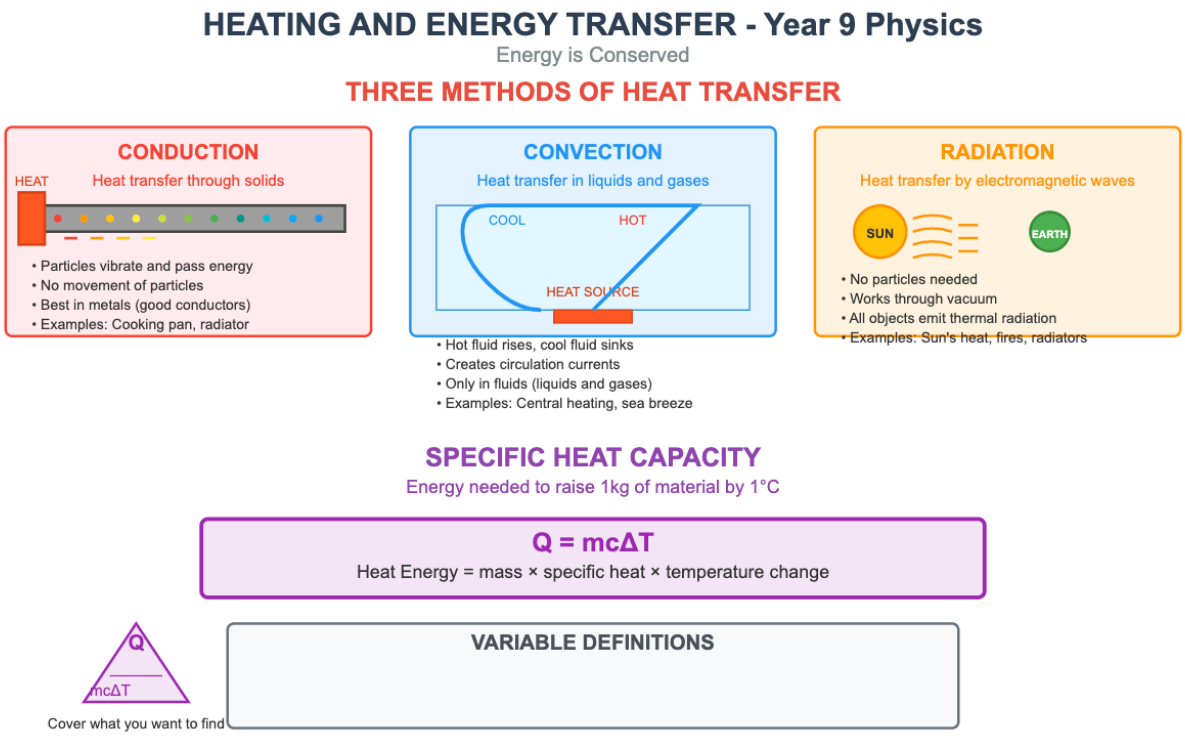
DISTANCE-TIME GRAPHS: • Slope = Speed • Steep slope = fast speed • Horizontal = stationary

VELOCITY-TIME GRAPHS: • Slope = Acceleration • Area under line = Distance • Horizontal = constant velocity

EXAM TIPS: Always label axes and units! Use triangles to calculate slopes. Remember: steep = fast, flat = slow/constant

Physics: Energy is Conserved

13. Heating and Energy Transfer - Conduction, Convection, Radiation - Specific Heat Capacity: (Q = mcT) - (Q =) heat energy, (m =) mass, (c =) specific heat, (T =) temperature change

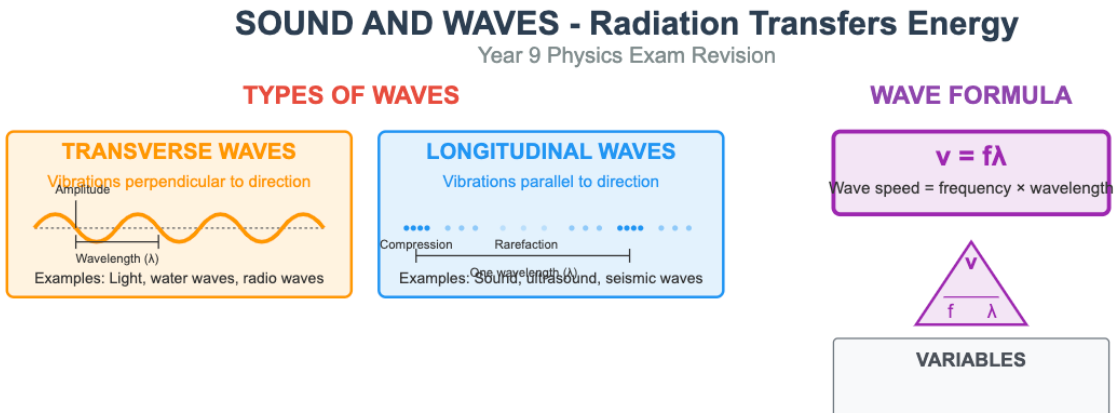


Q = Heat energy (Joules, J) **m** = Mass (kilograms, kg) **c** = Specific heat capacity (J/kg°C) **ΔT** = Temperature change (°C) **ΔT** = Final temp - Initial temp Always use temperature CHANGE, not final temperature WORKED EXAMPLES EXAMPLE 1: Find Q Heat 2kg of water from 20°C to 80°C m = 2kg, c = 4200 J/kg°C, ΔT = 60°C Q = mcΔT Q = 2 × 4200 × 60 Q = 504,000 J = 504 kJ EXAMPLE 2: Find ΔT 5kg copper, 50,000J energy added Q = 50,000J, m = 5kg, c = 380 J/kg°C ΔT = Q ÷ (mc) ΔT = 50,000 ÷ (5 × 380) ΔT = 26.3°C EXAMPLE 3: Find m Unknown mass of iron, 100,000J, ΔT = 50°C Q =

Physics: Radiation Transfers Energy

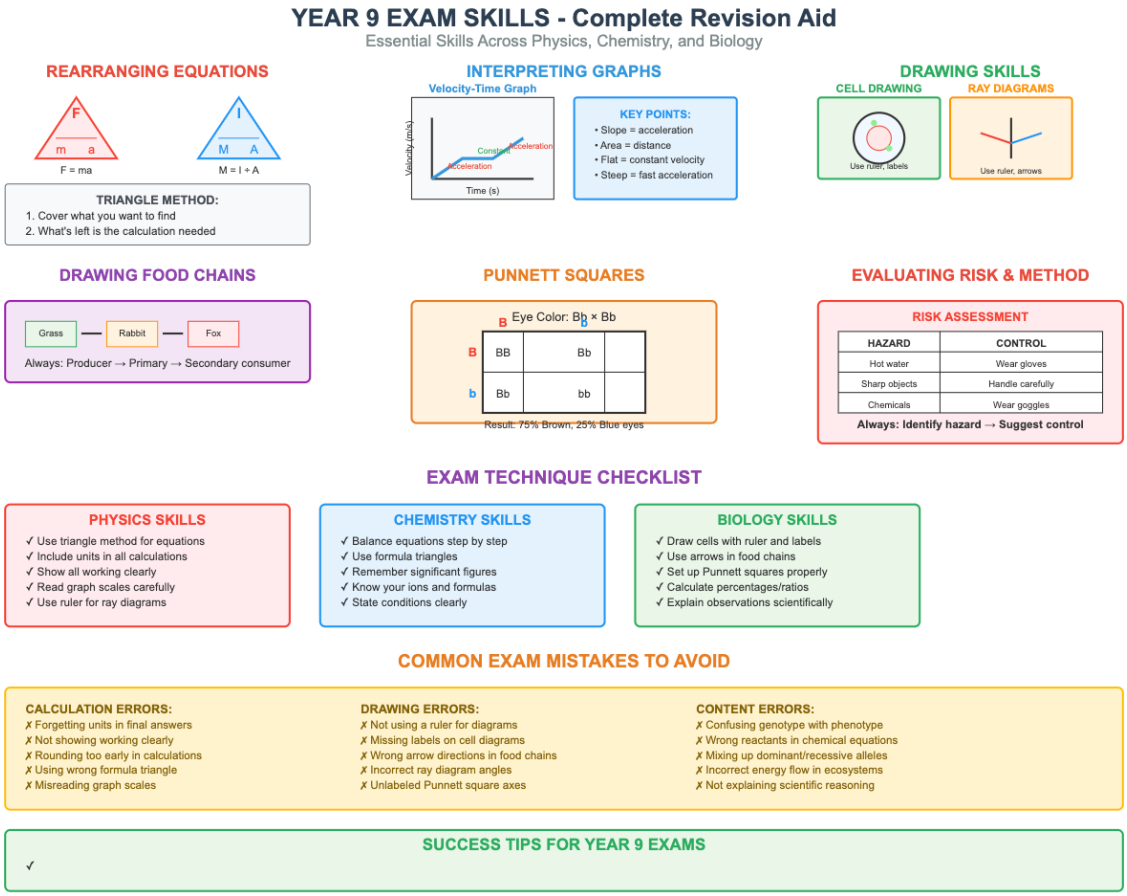
15. Sound and Waves - Longitudinal vs transverse waves - Wave formula: (v = f) - (v =) wave speed, (f =) frequency, (=) wavelength - Reflection: angle of incidence = angle of reflection - Refraction: wave bends at boundary due to speed change

Diagrams: - Ray diagrams showing reflection and refraction



v = wave speed (m/s) **f** = frequency (Hz) **λ** = wavelength (m) EXAMPLE f = 20 Hz, λ = 17 m v = 20 × 17 = 340 m/s (Speed of sound in air!) REFLECTION Angle of incidence = Angle of reflection Mirror Normal Incident ray Reflected ray i r i = r Both angles measured from normal REFRACTION Wave bends at boundary due to speed change Air (fast) Glass (slow) Normal Incident ray Refracted ray θ_1 θ_2 Ray bends TOWARDS normal when slowing down PRACTICAL EXAMPLES REFLECTION • Mirrors • Echoes • Periscopes REFRACTION • Lenses • Prisms • Water appearing shallow WAVE

Key Mathematical & Scientific Skills to Practice: - Rearranging equations (e.g. (F = ma), magnification) - Interpreting graphs and diagrams (e.g. velocity-time graphs) - Drawing cells, ray diagrams, food chains - Using and interpreting Punnett squares - Evaluating risk and method in experiments



Always read questions twice - underline key words ✓ **Show ALL working** - even if wrong method, you get method marks ✓ **Use scientific vocabulary** correctly ✓ **Check units match** the question ✓ **Practice past papers** regularly

Tips for Exam Success: - Always label diagrams clearly - Learn key formulas and be able to rearrange them - Show all working in calculations - Use scientific language in long answers

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End of Revision Summary