PHYSICS

Setting Out Calculations

OCR Physics A Specification H556

M2.1. Understand and use the symbols: =, <, >, ≪, ≫, ∝, ≈, Δ
M2.2. Change the subject of an equation, including nonlinear equations

An important part of Physics is using mathematical equations and formulae to find a numerical answer to a problem. The exam boards are clear on how they want this set out, so we in Physics have adopted an initialism – **FIRCCUS**

- **F –** State the **formula** you intend to use in the calculation
- **I – Insert** the numerical values from the question into the formula
- **R – Rearrange** to make the unknown value the subject of the formula
- **C – Calculate** the numerical answer (With a calculator – no marks for trying to do things in your head)
- **C – Check** your answer makes sense in context (e.g. is it likely that a car is travelling at 1500 m/s, or more likely you did not convert one of the used values correctly?)
- **U** – Ensure your answer has the require **units** for the calculated variable
- **S –** Ensure your answer is written to a suitable number of **significant figures**. A good guide is to look at the significant values used in the question. For most answers, the exam board will accept answers to three significant figures.

As an example:
When the current in the coil is 0.016 A, the force on the coil is 0.013 N.
The length of the wire that makes up the coil is 6.5 m.
Calculate the magnetic flux density around the coil in the electromagnet.

$$F = BIl$$ F - Formula

I - Insert Values

$$0.013 = B \times 0.016 \times 6.5$$

R - Rearrange

$$B = \frac{0.013}{0.016 \times 6.5}$$

C - Calculate

$$= 0.125 \text{ T}$$

C - Check (A Physics lab will have magnets close to 0.1 T. Anything higher becomes dangerous)

U - Units (tesla is the unit of magnetic flux density)

$$= 0.13 \text{ T}$$

S - Sig. Figures (All values in question given to two sig figs)

Useful videos

	Science Shorts How to do any Physics Calculation Link

Task

Find the answer to the following, showing FULL WORKING OUT as we would expect in Physics.

1. Find the p.d. of a device with a power of 9.0 W and 4.0W

$$Power = P.D. \times Current$$

2. Calculate the height of an object of mass 14 kg with a gravitational potential energy of 210 J. (g =9.8 m/s^2)

$$GPE = Mass \times Grav.Field\ Strength \times Height$$

3. Calculate the output p.d. of a transformer with an input p.d. of 240V, 200 turns on the primary coil and 40 turns on the secondary coil.

$$\frac{Input\ P.D.}{Output\ P.D.} = \frac{Turns\ on\ Primary}{Turns\ on\ Secondary}$$

4. Calculate the change of temperature of a 5.0 kg aluminium block given 9000 J of energy. (Specific Heat of Aluminium = 890 J/kg °C)

$$Energy = Mass \times Specific\ Heat\ Capacity \times Change\ in\ Temperature$$

5. Calculate the mass of a minibus that comes to a stop from a velocity of 21 m/s as the brakes do 800,000 J of work.

$$Kinetic\ Energy = \frac{1}{2}mv^2$$