Year 10 Physics Checklist
P2 Generating Electricity

Collecting Energy From the Sun
Describe that DC electricity is current in the same direction all the time.

Describe some advantages and disadvantages of using photocells to provide electricity:
• low maintenance; • no need for power cables; • no need for fuel; • long life; • rugged; • renewable energy resource; • no polluting waste; • no power at night or bad weather.

Describe how light produces electricity in a photocell: • energy absorbed by photocell; • electrons are knocked loose from the silicon crystal; • electrons flow freely.

Describe how the power of a photocell depends on: • light intensity; • surface area exposed.

Explain why passive solar heating works: • glass is transparent to light; • heated surfaces emit infrared; • glass reflects infrared.

An efficient solar collector must track the position of the Sun in the sky.

Describe the advantages and disadvantages of wind turbines:
• renewable; • rugged; • no polluting waste; • visual pollution; • dependency on wind speed; • space needed.

Generating Electricity
Describe and recognise the dynamo effect can be increased by:
• using stronger magnets; • more turns; • faster movement.

Dectibe the frequency of alternating current (AC) is the number of cycles per second.

Describe how simple AC generators work.
• coil of wire; • magnetic field; • coil and field close; • relative motion between coil and field.

Describe how electricity is generated at a conventional power station: • burning fuel; • producing steam; • spinning a turbine; • turbine turns generator.

Describe and recognise that there is significant waste of energy in a conventional power station.

Use these equations in the context of a power station to calculate energy input, energy output, waste energy output and efficiency.
• fuel energy input = waste energy output + electrical energy output;
• efficiency = electrical energy output / fuel energy input

Explain how transformers are used in the National grid: increased voltage reduces current, so decreasing energy waste by reducing heating of cables.

Fuels for Power
Describe that: • burning fuels releases energy as heat; • uranium fuel rods release energy as heat; • biomass can be fermented to generate methane.

Calculate the power rating of an appliance using the equation:
power = voltage × current

State and use the equation:
energy supplied = power x time
Given: • power in kW or W; • time in hours and / or minutes;• energy supplied in kilowatt hour.

Describe the advantages and disadvantage of using off-peak electricity in the home.

Nuclear Radiations
Recall that uranium is a non-renewable resource.

Recall that plutonium: • is a waste product from nuclear reactors; • can be used to make nuclear bombs.

Describe the advantages and disadvantages of nuclear power:
• decommissioning costs; • pollution from fuel processing; • risk of accidental emission of radioactive material; • high maintenance costs; • independence from fossil fuels; • high stocks of fuel; • no greenhouse gases.

Describe examples of beneficial uses of radiation: • alpha - smoke detectors; • beta - tracers and paper thickness gauges; • gamma - treating cancer, non-destructive testing and sterilising equipment.

Describe background radiation and state that it is caused by radioactive substances, rocks, soil, living things and cosmic rays.

Describe how alpha, beta and gamma can be identified by their penetrating power.

Explain ionisation in terms of: • removal of electrons from particles; • gain of electrons by particles.

Describe some ways of disposing radioactive waste
• low level waste in land-fill sites; • encased in glass and left underground; • reprocessed.

Explain the problems of dealing with radioactive waste:
• remains radioactive for a long time;• terrorist risk;
• must be kept out of groundwater; • acceptable radioactivity level may change over time.

Do not keep saying to yourself, if you can possibly avoid it, 'But how can it be like that?' because you will get 'down the drain' into a blind alley from which nobody has yet escaped. Nobody knows how it can be like that.

Richard Feynman