**Design & Technology**

**Wider issues of using cleaner technologies**

**Materials required for questions**

* Pencil
* Rubber
* Calculator

**Instructions**

* Use black ink or ball-point pen
* Try answer all questions
* Use the space provided to answer questions
* Calculators can be used if necessary
* For the multiple choice questions, circle your answer

**Advice**

* Marks for each question are in brackets
* Read each question fully
* Try to answer every question
* Don’t spend too much time on one question

**Good luck!**

**Q1.** Which one of the following is a biodegradable material?

**A** Silk

**B** Polythene

**C** Nylon

**Q2.** Which one of the following is a form of renewable energy?

**A** Coal

**B** Biomass

**C** Oil

**Q3.** Which of the following statements is true?

**A** Glass is biodegradable

**B** All hardwoods come from sustainable

sources

**C** Plywood can be made from sustainable

raw materials

**Q4.** How could you design a product to improve its carbon footprint?

**A** Source materials locally

**B** Order parts from abroad

**C** Use non-biodegradable materials

**Q5.** What does fair trade mean?

**A** It helps ensure farmers and workers

Are fairly paid

**B** It helps ensure that products are made

From renewable sources

**C** The item contains no animal products

**Q6.** Evaluate the use of biofuels as a source of energy **(8 marks)**

**Q7.** Evaluate the use of water as a source of renewable energy. **(5 marks)**

**Q8.** A manufacturer is considering two design options for some wheels on an electric scooter

* Solid wheels which would need to be replaced when damaged
* Pneumatic air filled wheels which could be repaired when they get punctured

Discuss the factors that need to be considered before deciding which option to produce **(6 marks**)

**Answers**

**Q1. A  
Q2. B  
Q3. C  
Q4. A  
Q5. A**

**Q6.**

**Advantages**

* Renewable source of energy (1)
* Reduces the need to consume other finite resources (1)
* Environmentally friendly (1)
* Carbon neutral (1)
* 2nd 3rd and 4th generation bio-crops are more efficient for fuel production (1)
* Biofuel gives increased power over comparable vehicle fuel (1)
* Combined usage (1)

**Disadvantages**

* Ecological damage (1)
* Expensive to convert into fuels (1)
* Relatively low yield (1)
* Energy used in processing bio-fuels (1)
* Reduced land available for growing crops (1)
* Fewer MPG than normal fuels (1)
* Limited availability when refueling (1)
* Unsustainable burden on available supplies (1)
* Systems modifications needed to use fuel (1)
* Biofuels still not reached maximum potential yet (1)

(Maximum of 5 from either advantages and disadvantages otherwise 4 marks)

**Q7.**

**Advantages**

* Hydroelectric, tidal and wave power can be harnessed (1)
* Fossil fuels are not required/preserved for future generations (1)
* Does not produce carbon dioxide/greenhouse gases/air pollution (1)
* Hydroelectric plants are highly efficient (1)
* Hydroelectric plants have longer economic lives than fuel fired plants (1)
* High initial setup cost quickly recovered after a few years (1)
* Reservoirs used for leisure/tourism and recreation (1)
* Large dams protect towns down stream and control flooding (1)
* Can provide off grid power in isolated locations (1)
* Reliable/free source of energy/inexpensive in comparison to fossil fuels (1)
* Water can be pumped using off peak power (1)
* No start-up time/instant power (1)
* Water is in abundant/unlimited supply and readily available (1)
* Reduced risk of environmental accident (1)
* low running costs (1)

Disadvantages

* High set-up costs (1)
* Reservoirs use large land area/footprint (1)
* Communities may be displaced (1)
* Rivers maybe diverted / cause problems for people who rely on the river economically (1)
* Dam failures have the potential for disasters (1)
* Greenhouse gasses produced can be high in tropical regions due to decay of plant life in reservoirs producing methane (1)
* Disruptive to surrounding ecosystems (1)
* Cause changes to the downstream river environment (1)
* Visually intrusive (1)
* High maintenance costs (1)
* Difficult environment for maintenance (1)
* Not suitable for all locations (1)

Maximum 4 marks if all advantages or all disadvantages

**Q8.**

* Chair ability of materials and the potential frequency of need for a placement over power in relation to predicted lifespan of the scooter
* Expertise and access to tools and equipment required of each option
* Availability of and/or compatibility of generic replacement wheels
* Environmental impacts of each option
* Effects on the performance of the product
* How the design of the scooter/wheel will be affected by allowing for removal of the wheels by consumers
* The potential impact of frequent removal on connected elements/parts of the scooter wheels