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Environmental Studies ENVS3

(Specification 2440)

Unit 3: Energy Resources and Environmental Pollution

Report on the Examination

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General

This proved to be a paper that most students found to be accessible. The answers given often showed that students were well prepared for the examination and an increased number used appropriate technical terminology to support their answers.

Question 1

Most students gained high marks, although some lost marks by adding too many ticks.

Question 2

(a) (i)/(ii) Most students had an understanding of the principles of Critical Pathway Analysis (CPA) and Critical Group Monitoring (CGM). Poorer answers in **(i)** repeated the question, using the term 'pathway' without explaining what it means. Some believed that the pathway itself could be controlled or moved.

(b) Most students gave good descriptions of how biotic indices can be used. Weaker students thought the organisms were planted or introduced into the environment to see how they are affected.

Question 3

(a) (i)/(ii) These were generally well answered, with most students referring to a change in the fuels used, such as less coal and more natural gas or nuclear electricity.

(b) This was surprisingly poorly answered. Marks could be gained in two main areas: specific method details and general methodology, such as the number and size of samples, or the control of other variables. The term 'fair test' was often used with no description of what it meant or how it was achieved.

Question 4

(a) It was hoped that students would use recent or current developments as examples, but any technological improvements were given credit.

(a) (i) Most students that gave correct answers referred to secondary or tertiary crude oil recovery. Others used coal gasification or shale fracking as examples.

(a) (ii) Heliostats, parabolic reflectors, multi-layer photovoltaics and evacuated photothermal tubes were used as good examples, as was the use of storage technologies that make solar power more usable, such as hydrogen.

(a) (iii) Fewer students knew how improvements in wind power technology had increased exploitation. The most common answer was the use of vertical axis turbines, which are more usable in urban areas where wind direction often changes rapidly.

(b) This was generally poorly answered. Many students ignored the instruction in the question and wrote specifically about land use issues. Only better

students knew that the land topography affects wind velocity and that the velocity and direction of the wind change over a range of time scales, so the best site may be different on different occasions, hence the need for frequent data collection over long periods of time.

Question 5

(a) Most students understood that double glazing prevents heat loss by reducing convection currents.

(b) (i) Many students knew, or deduced, that argon is a poorer conductor than air.

(b) (ii) Many students knew that convection and conduction cannot occur in a vacuum.

(c) Most students drew an appropriate curve, with heat loss being greater with small or large gaps.

(d) This was well answered, with most students stating that large windows facing the direction with the most intense sunlight (usually southwards) increases passive solar gains.

(e) Most students gave descriptions of heat exchangers. Better students included details such as counter-current flow, increased pipe surface area, thin pipe walls and the use of good conductors.

Question 6

(a) This question was generally well answered, although some students confused breakdown with dispersal. Temperature, light and the presence of bacteria were the most commonly quoted factors.

(b) This was generally very well answered, with many students giving well-constructed answers that joined important properties such as persistence, liposolubility, bioaccumulation and biomagnification.

Question 7

Many students had difficulty giving a clear description of a single method to investigate the relationship between turbidity and light penetration.

Some gave good descriptions of the use of secchi disks. Descriptions of lab-based studies often lacked clear descriptions of exactly what was happening. Precautions to standardise the method were often missing, such as: identical light sources, distance between the light and water container or the control of other light sources.

Question 8 (essay question)

(a) Many students included most of the key problems involved in replacing fossil fuels with renewable energy resources such as reliability, intermittency, energy density, storability, form of energy produced and current level of technical development. The importance of some factors, while not losing marks, were overstated, especially the materials needed to make the equipment and NIMBYism over windfarms.

(b) Students that chose this essay included a range of laws and related agreements and protocols, all of which were accepted as being legislation. These included the Kyoto and Montreal protocols, the Clean Air Act (1956) and Landfill Tax. Students gained credit where they could describe the controls, even if they could not name the legislation, such as emission controls in vehicle MOTs, congestion charges, control of radioactive waste disposal, design for end of life regulations and restrictions on dumping waste at sea. Weaker answers named some laws but failed to give any details of how they worked.

(c) This essay produced some weak answers with very general descriptions. A minority of students gave well-structured answers showing how a change in energy exploitation could reduce pollution. Better answers included details of changes in the resources used, better methods of extraction, processing, combustion or methods of post-combustion pollution control. Methods used to reduce energy use through improvements in exploitation efficiency also gained credit.

Mark Ranges and Award of Grades
Grade boundaries and cumulative percentage grades are available on the **Results statistics** page of the AQA Website.

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