# 3.3 Energy: 10-minute Pack

Calculator allowed · about 10 minutes

Name: _____ Date: ____ / ____ / _____

**Answer ALL questions. Show all your working.**

**1** The UK generates electricity using both wind turbines and coal-fired power stations. Evaluate the use of wind power compared with coal power for generating the UK's electricity. In your answer, consider reliability, cost and environmental impact.

**(6)**

**2** State the main method of thermal energy transfer (conduction, convection or radiation) taking place in each example.

**(a)** A metal spoon left in a hot pan of soup gets hot. **(1)**

**(b)** Water in a pan circulates as it heats up towards boiling. **(1)**

**(c)** You feel warmth from a bonfire without touching it. **(1)**

**(d)** Warm air rises above a hot radiator and circulates around a room. **(1)**


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# Mark scheme · 3.3 Energy: 10-minute Pack

## Question 1

**Level 1** Simple statements are made about wind and/or coal power, with limited or no comparison. Points may be isolated and not clearly linked to reliability, cost, or environmental impact. **1-2**

**Level 2** A description of some relevant features of wind and coal power is given, with some comparison between them. At least two of reliability, cost, and environmental impact are addressed, though the argument may be one-sided or incomplete. **3-4**

**Level 3** A clear, balanced evaluation is given, comparing wind and coal power across reliability, cost, and environmental impact, leading to a justified overall conclusion. **5-6**

**Indicative content:**

- Wind power is renewable and produces no carbon dioxide during generation; coal is non-renewable and produces carbon dioxide and other pollutants when burned, contributing to climate change and poorer air quality
- Wind power is unreliable because output depends on wind speed; there is no electricity generated when there is no wind, and turbines can be shut down in very high winds
- Coal power stations can generate electricity reliably on demand, regardless of weather, and can be scaled up quickly to meet peak demand
- Wind turbines have relatively high initial construction costs but very low running costs (no fuel to buy); coal stations have lower construction costs but ongoing fuel costs and are subject to fluctuating coal prices
- Wind farms can have a visual and noise impact on the landscape and may affect local wildlife (for example birds); coal mining and burning can cause land damage and long-term environmental harm
- A balanced electricity supply may use a mix of both, or increasingly renewables backed up by storage or other reliable sources, to balance reliability with environmental impact
- Conclusion should weigh the long-term environmental benefits of wind power against the reliability advantages of coal, coming to a justified overall judgement

## Question 2

(a) conduction cao **B1**

(a) Answer: **Conduction**

(b) convection cao **B1**

(b) Answer: **Convection**

(c) radiation (infrared radiation) cao **B1**

(c) Answer: **Radiation**

(d) convection cao **B1**

(d) Answer: **Convection**


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