



**Subject:** Grade 7 Natural Sciences

**Topic:** Energy transfer and the national grid

**Total:** 37 Marks

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1. Transformers | Transformer

3 marks

**Explanation:**

In order to carry electricity efficiently through the national grid and deliver it safely to houses, voltages have to be increased and decreased. This is done by devices known as transformers.

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2. Blades of the turbine is turned by falling water. Mechanical energy is transferred to a generator. | Blades of the turbine is turned by steam. Steam is produced by a chemical reaction. Mechanical energy is transferred to a generator. | Blades turn an axle attached to a gearbox. The gearbox transfers mechanical energy to a generator. | Up and down movement of water creates an air column. Changes in the air column turn the blades of a turbine.

8 marks

**Explanation:**

The basic operation of hydro-electric and nuclear power stations is almost the same as for coal-fired power stations. In hydro-electric power stations, the blades of a turbine is turned by falling water. In nuclear power stations, heat energy is supplied by a nuclear reaction. This converts water to steam and the steam turns the blades of a turbine.

The wind turbines on a wind farm each have its own small generator inside.

In a tidal power plant the movement of waves is used to created an air column that is compressed and decompressed. Changes in the air column turns the blades of a turbine.

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3. false

2 marks

**Explanation:**

Cell phones and laptops are battery-powered, but the batteries have to be recharged regularly. The charging process requires electricity. Although only a small amount of electricity is needed for charging, it will make a difference to your electricity usage over a period of time.

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4. false

2 marks

**Explanation:**

In fuel-powered motor vehicles, most of the chemical potential energy in the fuel is used to make the vehicle's engine work. Only a small amount of the input energy is converted to kinetic energy.

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5. B: A dynamo converts electrical energy to mechanical energy.

4 marks

**Explanation:**

A dynamo is a generator that makes use of the rotation of conducting coils in a magnetic field. Kinetic energy is needed to rotate either the coils or the magnetic field. The rotation produces electrical energy. Kinetic energy is a form of mechanical energy. That is why we say that generators convert mechanical energy to electrical energy.

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6. system

3 marks

**Explanation:**

A system consists of different parts working together to perform a certain task. The national electricity supply system consists of different electrical parts or circuits that work together to spread electricity throughout the country.

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7. heat

3 marks

**Explanation:**

Candles are mainly used for their light. The heat energy that is produced by a candle is not used and therefore it is an unwanted energy output.

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8. B: Total output energy: 2 200 J

Unwanted output energy: 800 J

Useful output energy: 1 400 J

4 marks

**Explanation:**

A food processor is used to perform certain tasks in the preparation of food. This includes cutting, slicing, grinding, mixing and grating.

The only useful output energy is kinetic energy. Sound and heat does not contribute to these tasks.

The unwanted output energy is  $300 \text{ J} + 500 \text{ J} = 800 \text{ J}$ . The useful output energy is 1 400 J.

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9. C: alarm clock

4 marks

**Explanation:**

Sound is an unwanted energy output in a hair dryer, drill and fan. These appliances are not made to produce sound. An alarm clock, however is made to produce sound when it is set for a certain time.

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10. C: Use the larger plates on the electric stove rather than the smaller ones.

4 marks

**Explanation:**

Switching off lights and not using electric heaters means that less electricity is used. If the electric geyser is covered by an insulator, the hot water inside the geyser will stay hot for longer. Therefore less electrical energy is needed to heat the water again. Larger stove plates use more electrical energy than smaller ones, because a larger surface area has to be heated.

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**Total:** 37 Marks