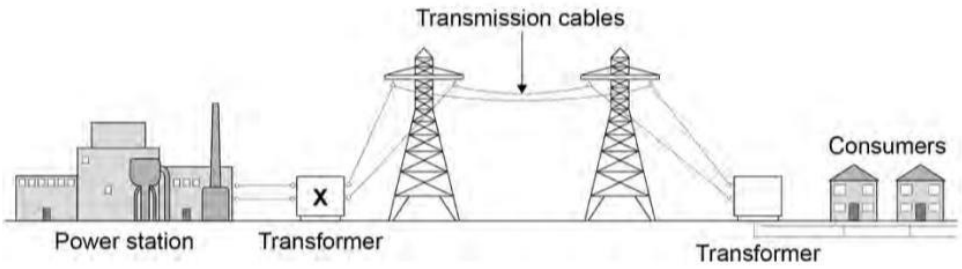
# Qno. 1

**0 1** **Figure 1** shows how the National Grid connects a power station to consumers.

**Figure 1**




**0 1 . 1** Complete the sentences.

**[2 marks]**

Transformer **X** causes the potential difference to _____ .

Transformer **X** causes the current to _____ .

Use the Physics Equations Sheet to answer questions **01.2** and **01.3**.

**0 1 . 2** Which equation links current ($I$), power ($P$) and resistance ($R$)?

**[1 mark]**

Tick (✓) **one** box.

$P = \frac{I}{R}$ ☐

$P = \frac{I}{R^2}$ ☐

$P = I^2 R$ ☐

$P = IR$ ☐

Do not write outside the box

**0 1 . 3** A transmission cable has a power loss of $1.60 \times 10^9$ W.

The current in the cable is 2000 A.

Calculate the resistance of the cable.

**[3 marks]**

Resistance = _____ Ω

Use the Physics Equations Sheet to answer questions **01.4** and **01.5**.

**0 1 . 4** Write down the equation which links efficiency, total energy input and useful energy output.

**[1 mark]**

**0 1 . 5** The total energy input to the National Grid from one power station is 34.2 GJ.

The National Grid has an efficiency of 0.992

Calculate the useful energy output from this power station to consumers in GJ.

**[3 marks]**

Useful energy output = _____ GJ

**10**

# Qno.2

**0 1** **Figure 1** shows a large wind farm off the coast of the UK.

**Figure 1**

The mean power output of the wind farm is 696 MW, which is enough power for 580 000 homes.

**0 1 . 1** Calculate the mean power needed for 1 home.

Give your answer in watts.

**[2 marks]**

Mean power needed for 1 home = _____ W

Do not write outside the box

**0 1 . 2** On one day the demand for electricity in the UK was 34 000 MW.

Suggest **two** reasons why wind power was not able to meet this demand.

**[2 marks]**

1 _____

_____

_____

2 _____

_____

_____

**0 1 . 3** Some of the energy from the wind used to rotate a wind turbine is wasted.

An engineer oils the mechanical parts of a wind turbine.

Explain how oiling would affect the efficiency of the wind turbine.

**[3 marks]**

_____

_____

_____

_____

_____

**0 1 . 4** In most homes in the UK there are many different electrical devices.

Explain why people should be encouraged to use energy efficient electrical devices.

**[2 marks]**

_____

_____

_____

_____

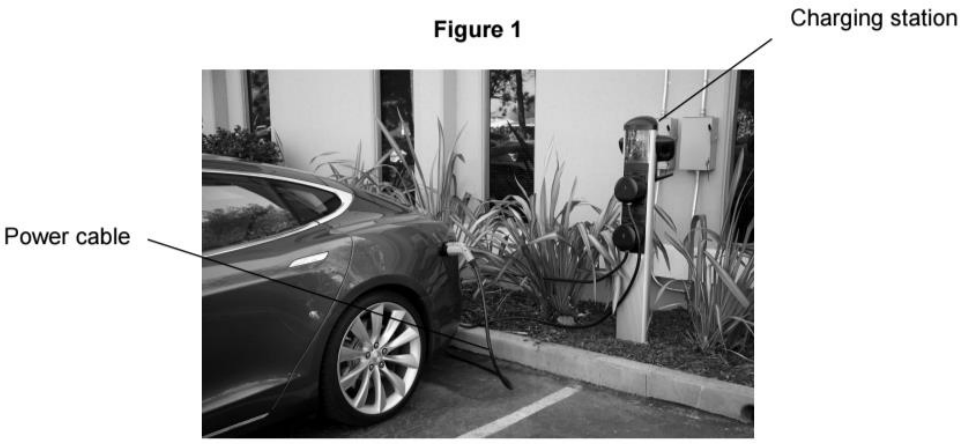
_____

9

# Qno.3

**0 1** **Figure 1** shows an electric car being recharged.

**Figure 1**




**0 1 . 1** The charging station applies a direct potential difference across the battery of the car.

What does 'direct potential difference' mean?

**[1 mark]**

Do not write outside the box

**0 1 . 2** Which equation links energy transferred ($E$), power ($P$) and time ($t$)?

**[1 mark]**

Tick (✓) **one** box.

energy transferred = $\frac{\text{power}}{\text{time}}$ ☐

energy transferred = $\frac{\text{time}}{\text{power}}$ ☐

energy transferred = power × time ☐

energy transferred = power$^2$ × time ☐

**0 1 . 3** The battery in the electric car can store 162 000 000 J of energy.

The charging station has a power output of 7200 W.

Calculate the time taken to fully recharge the battery from zero.

**[3 marks]**

Time taken = _____ s

Do not write outside the box

**0 1 . 4** Which equation links current ($I$), potential difference ($V$) and resistance ($R$)?

**[1 mark]**

Tick (✓) **one** box.

$I = V \times R$ ☐

$I = V^2 \times R$ ☐

$R = I \times V$ ☐

$V = I \times R$ ☐

**0 1 . 5** The potential difference across the battery is 480 V.

There is a current of 15 A in the circuit connecting the battery to the motor of the electric car.

Calculate the resistance of the motor.

**[3 marks]**

Resistance = _____ Ω

**0 1 . 6** Different charging systems use different electrical currents.

- Charging system **A** has a current of 13 A.
- Charging system **B** has a current of 26 A.
- The potential difference of both charging systems is 230 V.

How does the time taken to recharge a battery using charging system **A** compare with the time taken using charging system **B**?

**[1 mark]**

Tick (✓) **one** box.

Time taken using system **A** is half the time of system **B** ☐

Time taken using system **A** is the same as system **B** ☐

Time taken using system **A** is double the time of system **B** ☐

*Do not write outside the box*

10