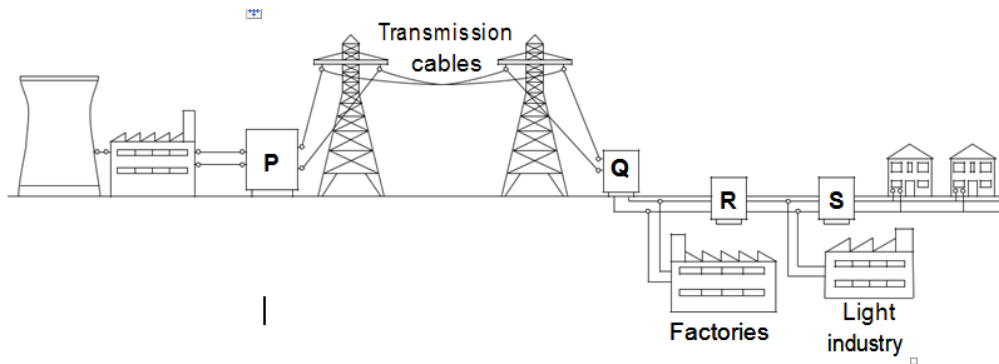


National Grid Mcqs

Q:1 The diagram shows a power station supplying electricity to the National Grid. There are four transformers in the system, labelled P, Q, R and S.



A Which row in the table correctly describes each transformer?

	P	Q	R	S
1	step up	step down	step down	step down
2	step down	step up	step up	step up
3	step up	step down	step up	step down
4	step up	step up	step down	step down

B The voltage across the overhead transmission cables is very high.

The best explanation for this is that . . .

- 1) it allows thinner cables to be used and the energy loss from the cables is reduced.
- 2) the energy loss from the cables is reduced and it allows the distance between pylons to be reduced.
- 3) the distance between the pylons can be reduced and thicker cables can be used.
- 4) it allows the current to travel more slowly and thicker cables can be used.

C Changing the voltage between the power station and the transmission cables using transformer P also changes the current flowing and the efficiency of distribution.

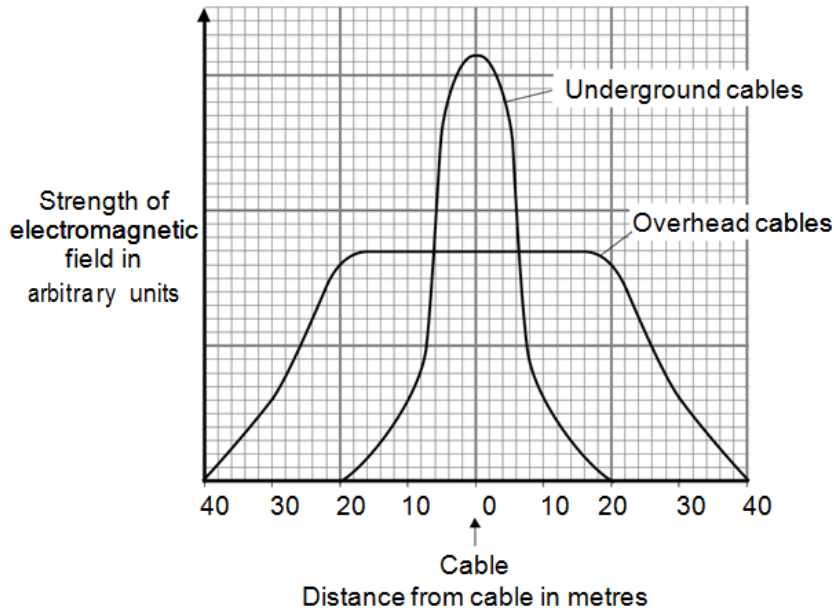
Which row of the table correctly shows these changes?

	Voltage	Current	Efficiency
1	increases	increases	increases
2	decreases	decreases	increases
3	decreases	decreases	decreases
4	increases	decreases	increases

D Transmission cables can either be suspended from pylons above ground or they can be buried underground.

An electromagnetic field is produced when an electric current flows through a cable. Some people think that these fields can cause a health risk.

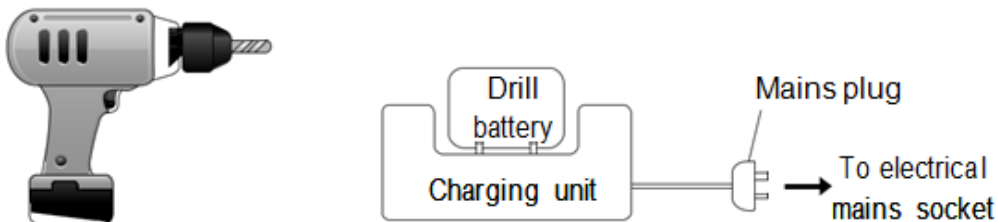
The graph shows how the strength of the electromagnetic field varies with distance from the cable for both overhead cables and underground cables.



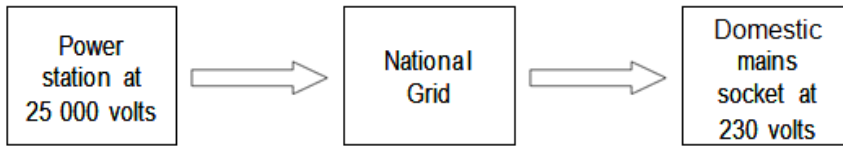
Which of the following conclusions could be made from the graph?

- 1) When you are within 5 metres of the cable, the possible risk to health is bigger with an underground cable.
- 2) The possible health risk from overhead cables falls to zero when you are 20 metres away.
- 3) The biggest possible health risk from overhead cables occurs when you are 40 metres away.
- 4) Between 10 and 20 metres away, the biggest possible health risk is from underground cables.

Q:2 The diagram shows a cordless drill. The drill is powered by a 24-volt battery, which must be charged before the drill can be used. The battery is plugged into a charging unit, and the charging unit is connected to an electrical mains socket. The mains voltage is 230 volts.



The flow diagram shows how electricity is delivered to the mains socket from a power station.



The process of getting electricity from the power station to a domestic mains socket involves . . .

- 1) step-up transformers only.
- 2) step-down transformers only.
- 3) step-up and step-down transformers.
- 4) no transformers.

B A manufacturer makes several statements about a 24-volt cordless drill compared to a 230-volt mains-operated drill.

Which of the following statements about the cordless drill are true?

- J It is safer because there are no trailing cables to trip over.
- K There is less risk of severe electrical shock because it operates at a lower voltage and current.
- L When charged, it can be used in remote locations where there is no electricity supply.

- 1) J and K only
- 2) K and L only
- 3) J and L only
- 4) J, K and L

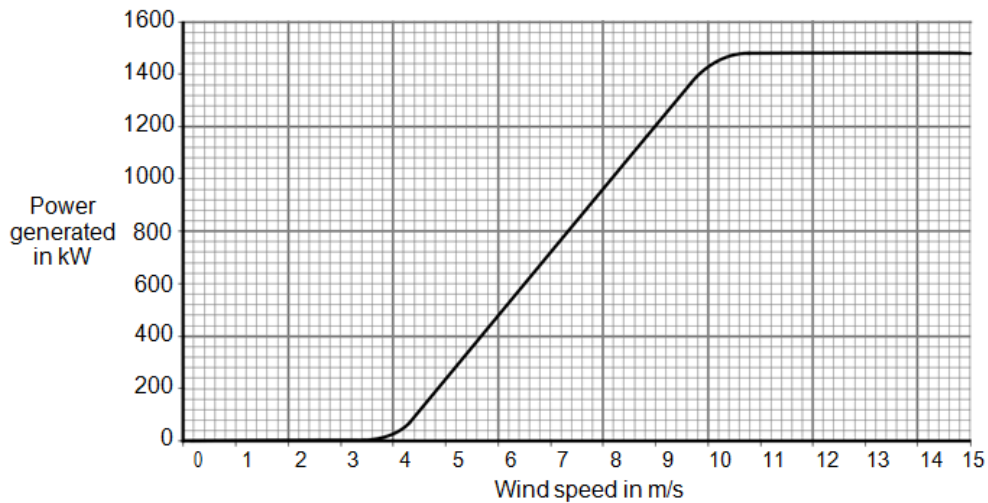
C The drill can produce a maximum of 72 watts continuous power for 6 minutes before it starts to overheat.

energy transferred (kilowatt-hour, kWh)	=	power (kilowatt, kW)	×	time (hour, h)
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The energy transferred by the drill during this time is . . .

- 1) 0.0072 kWh
- 2) 0.0432 kWh
- 3) 7.2 kWh
- 4) 432 kWh

Q:3 The graph shows how the power generated by a wind turbine varies with wind speed.



A The graph shows that . . .

- 1) the wind speed has a maximum value of 15 m/s.
- 2) the wind turbine shuts down at a wind speed of 15 m/s.
- 3) the wind speed has a minimum value of 3.5 m/s.
- 4) the wind turbine does not work at speeds below 3.5 m/s.

B The wind turbine transfers 6000 kWh of energy in 5 hours.

energy transferred (kilowatt-hour, kWh)	=	power (kilowatt, kW)	×	time (hour, h)
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What was the average wind speed?

- 1 6.4 m/s
- 2 9.0 m/s
- 3 10.5 m/s
- 4 15.0 m/s

C The Thanet Offshore wind farm was opened in 2010. It has 100 turbines, each 380 feet high.

The wind farm cost £780 million to build. The scheme has many critics.

Which of the following statements is a legitimate criticism?

- 1) Wind-generated electricity now powers 3 million homes in the UK.
- 2) Wind farms use a renewable source and, when working, do not contribute to global warming.
- 3) Wind farms must be backed up by more reliable energy sources such as coal or nuclear.
- 4) In the next decade, it is expected that 30 % of the UK's electricity will be generated from wind.

D A wind farm sends its electricity to the National Grid. To transmit the electricity using the National Grid, with a minimum of energy loss, the electricity has to be transmitted at . . .

- 1) low voltage and low current.
- 2) low voltage and high current.
- 3) high voltage and low current.
- 4) high voltage and high current

Q:4 Transformers are used in the National Grid.

A Two types of transformer are used in various parts of the National Grid.

Which row in the table shows the correct locations of the two types of transformer?

	Between generators and power lines	Between power lines and substation	Between substation and people's homes
1	step-down	step-down	step-up
2	step-down	step-up	step-up
3	step-up	step-down	step-down
4	step-up	step-up	step-down

B Transformers alter the potential difference across the power lines and the current through the power lines. These changes affect the efficiency of the power lines.

Which row in the table is correct?

	Potential difference across power lines	Current through power lines	Efficiency of transmission
1	decreased	decreased	decreased
2	decreased	increased	increased
3	increased	decreased	increased
4	increased	increased	increased

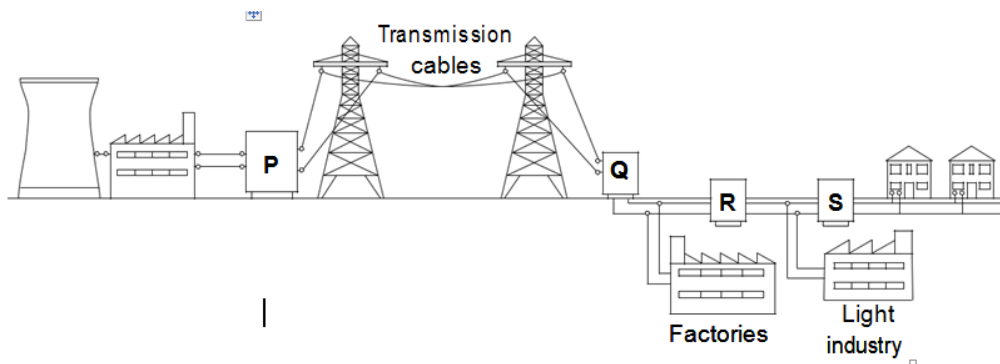
C The table shows the percentage of energy wasted as heat and sound by four different transformers. Which transformer has the highest efficiency?

Transformer	Percentage of energy supplied to transformer which is wasted as sound	Percentage of energy supplied to transformer which is wasted as heat
1	1.1	7.4
2	1.2	4.7
3	1.3	5.4
4	1.4	6.9

D The amount of electricity that a device transforms depends on the rate at which the device transforms energy and . . .

- 1) how long the device is switched on.
- 2) the current through the device.
- 3) the potential difference across the device.
- 4) the power of the device.

Q:5 Power stations produce electricity and the National Grid distributes it to our homes and to factories.



A Electricity is transferred along the transmission cables at high voltage so that . . .

- 1) fewer pylons need to be used.
- 2) less energy is lost in the cables.
- 3) the current in the cables is also high.
- 4) thicker cables can be used.

B The two transformers, P and Q, are needed to . . .

- 1) change heat to electrical energy at P and electrical energy to heat at Q.
- 2) change the current at P to a higher value and the current at Q to a lower value.
- 3) change the voltage at P from ac to dc and the voltage at Q from dc to ac.
- 4) change the voltage at P to a higher value and the voltage at Q to a lower value.

C Power stations use gas, coal, oil or uranium as the fuel.

Which of these fuels does not produce carbon dioxide when it is used?

1) coal

2) gas

3) oil

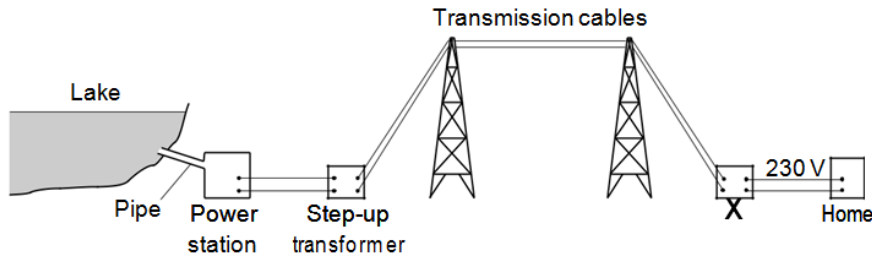
4) uranium

D A hydroelectric power station does not release carbon dioxide into the atmosphere.

Which row in the table gives a correct advantage and a correct disadvantage of hydroelectric power stations?

	Advantage	Disadvantage
1	Valleys are flooded to form large lakes.	The building costs are very high.
2	There are no fuel costs.	They take a long time to start up.
3	They can be started up quickly.	Habitats are flooded to make large lakes.
4	No wildlife habitats are destroyed during construction.	Valleys are flooded to produce large lakes.

Q:6 The diagram shows a hydroelectric power station connected to the National Grid.



A The step-up transformer increases the . . .

1)current.

2)energy.

3)power.

4)voltage.

B Using a step-up transformer . . .

1)makes the transmission cables warmer.

2)makes the electricity move faster.

3)reduces the energy loss in the transmission cables.

4)reduces the risk of electrocution.

C The voltage across the transmission cables is 400 000 volts. Before the electricity can be used in homes, it is reduced to 230 volts. The device that does this is labelled X on the diagram.

Device X is a . . .

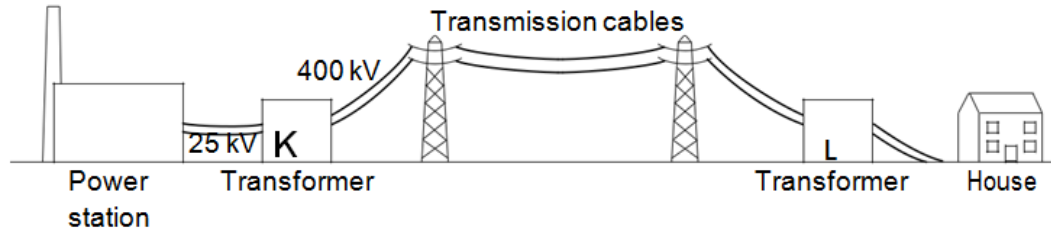
1)boiler.

2)generator.

3)step-down transformer.

4)thermal circuit breaker.

Q:7 Electricity is transmitted around the country through the National Grid.



The voltage from the power station is stepped up from 25 kV to 400 kV in transformer K so that . . .

- 1) the current decreases.
- 2) the current increases.
- 3) the current travels faster.
- 4) the current travels more slowly.

B Increasing the voltage also . . .

- 1) increases energy losses from the cables.
- 2) makes the National Grid more efficient.
- 3) makes the National Grid safer.
- 4) means a step-down transformer is not needed.

C Which row of the table shows what happens in transformer L ?

	Current	Voltage
1)	decreases	decreases
2)	decreases	increases
3)	increases	decreases
4)	increases	increases

D The amount of electrical energy that a device transfers depends on . . .

1)the current flowing through the device only.

2)for how long the device is switched on only.

3)the power of the device only.

4)the power of the device and for how long it is switched on.

TOTAL MARKS=26