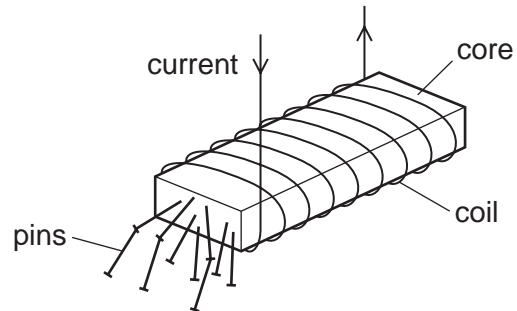


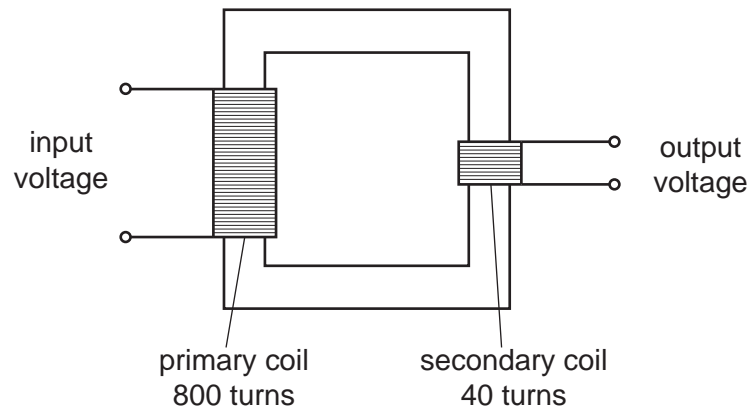
1 A strong electromagnet is used to attract pins.



What happens when the current in the coil is halved?

- A** No pins are attracted.
- B** Some pins are attracted, but not as many.
- C** The same number of pins is attracted.
- D** More pins are attracted.

2 The diagram shows a transformer.



The input voltage is 240V.

What is the output voltage?

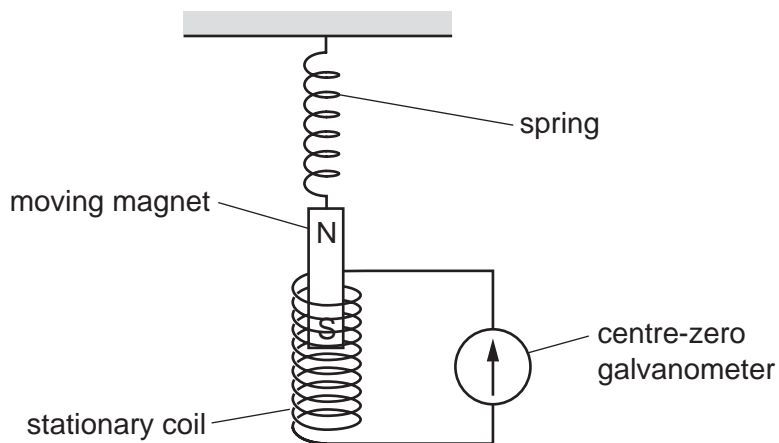
- A** 6.0V
- B** 12V
- C** 20V
- D** 40V

3 A coil carries a current in a magnetic field. The coil experiences a turning effect.

Which device uses this effect?

- A a d.c. motor
- B an electromagnet
- C a relay
- D a transformer

4 A magnet is suspended from a spring so that it can move freely inside a stationary coil. The coil is connected to a sensitive centre-zero galvanometer.

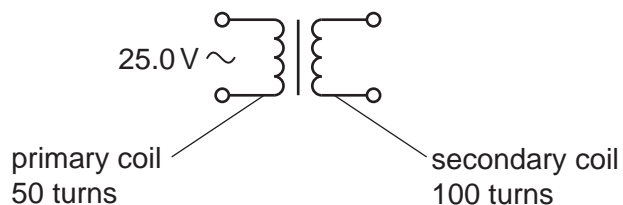


The magnet repeatedly moves slowly up and down.

What does the galvanometer show?

- A a constantly changing reading
- B a steady reading to the left
- C a steady reading to the right
- D a steady reading of zero

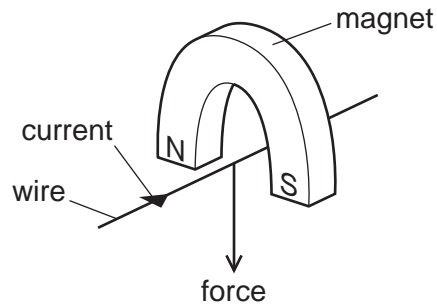
5 A transformer has 50 turns on its primary coil and 100 turns on its secondary coil. An alternating voltage of 25.0 V is connected across the primary coil.



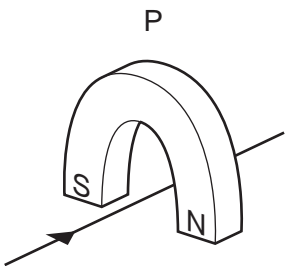
What is the voltage across the secondary coil?

- A 12.5V
- B 50.0V
- C 100V
- D 200V

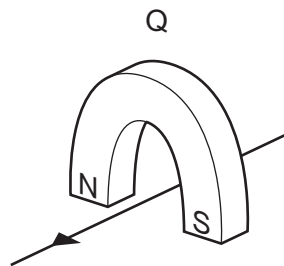
- 6 A wire is placed between the poles of a horseshoe magnet. There is a current in the wire in the direction shown, and this causes a force to act on the wire.



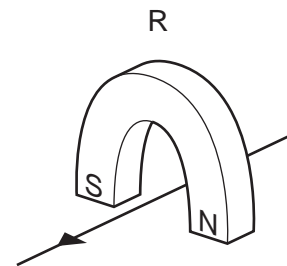
Three other arrangements, P, Q and R, of the wire and magnet are set up as shown.



magnet turned around



current direction reversed



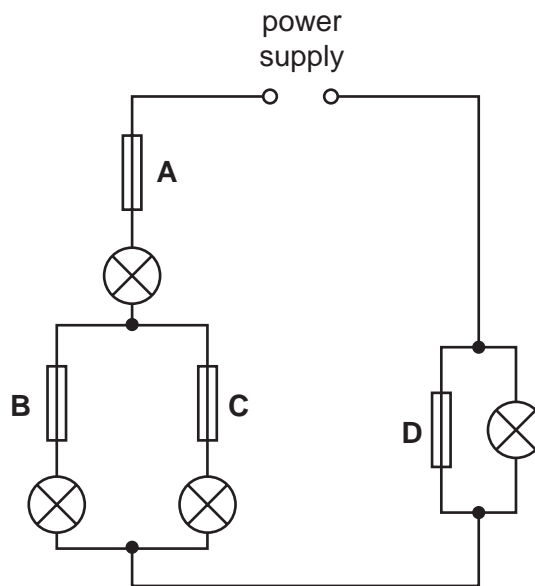
current direction reversed and magnet turned around

Which arrangement or arrangements will cause a force in the same direction as the original arrangement?

- A** P, Q and R    **B** P and Q only    **C** P only    **D** R only

7 In the circuit shown, only one of the fuses has blown, but none of the lamps is lit.

Which fuse has blown?



8 What is an advantage of transmitting electricity at a high voltage?

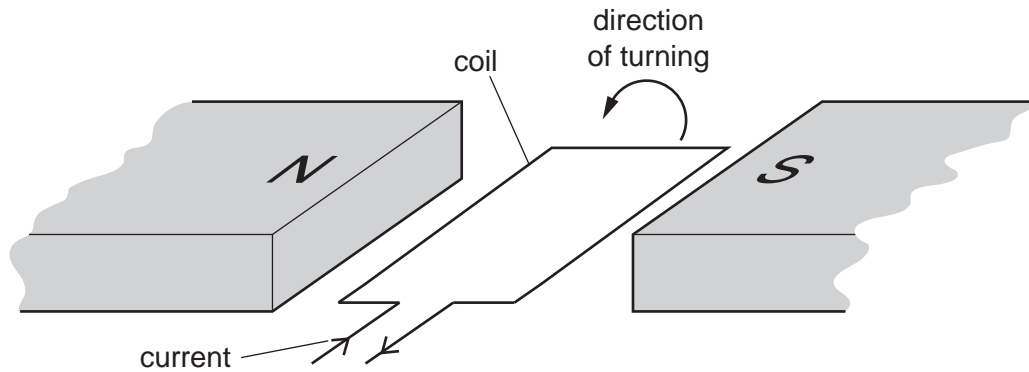
- A It is faster.
- B It is safer.
- C Less energy is wasted.
- D Less equipment is needed.

9 An e.m.f. is induced across a wire when it moves through the magnetic field between the poles of a magnet.

Which electrical device operates because of this effect?

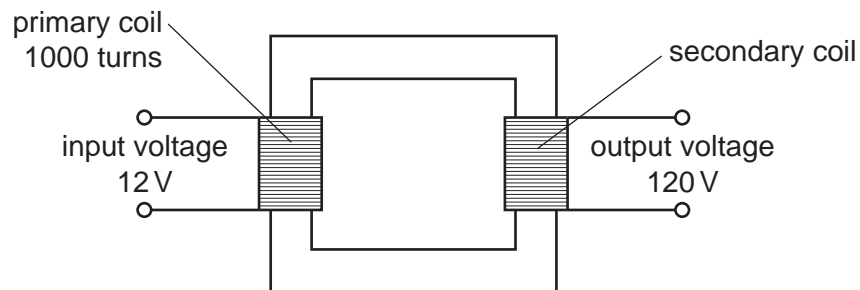
- A a battery
- B a cathode-ray tube
- C a generator
- D a motor

- 10 The diagram shows a flat, rectangular coil placed between the poles of a magnet. There is a current in the coil that makes it turn in the direction shown in the diagram.



Which change would make the coil turn in the opposite direction?

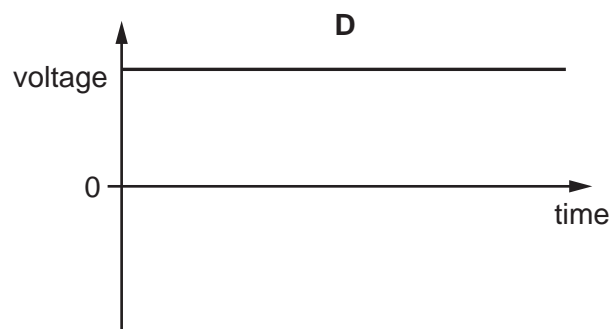
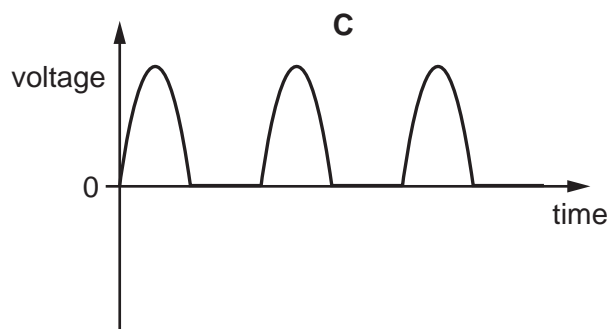
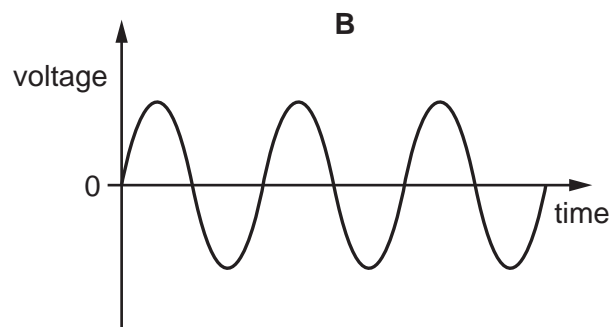
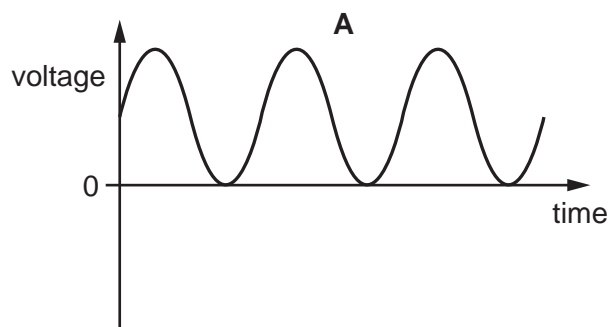
- A decreasing the current in the coil
  - B increasing the number of turns on the coil
  - C reversing both the direction of the current in the coil and the poles of the magnet
  - D reversing only the direction of the current in the coil
- 11 A transformer has 1000 turns on its primary coil. An input voltage of 12V is applied to the primary coil, and an output voltage of 120V is induced across the secondary coil.



How many turns are on the secondary coil of the transformer?

- A 100
- B 120
- C 1000
- D 10000

12 Which diagram represents the voltage output of a simple a.c. generator?

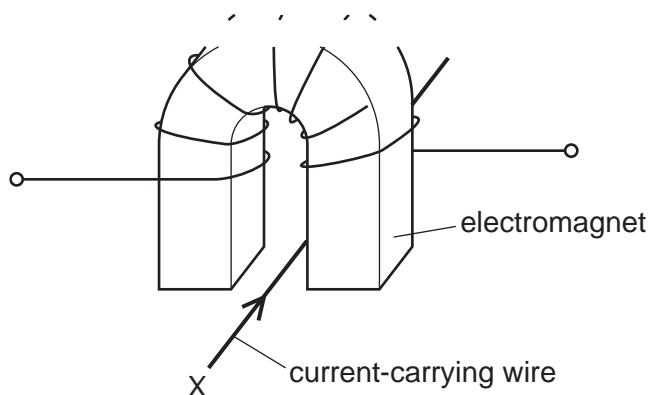


13 A step-up transformer is used before electricity is transmitted by overhead cables.

Which statement explains why the step-up transformer is used?

- A** It increases the current to increase the speed at which the electricity travels.
- B** It increases the current to reduce energy loss in the cables.
- C** It increases the voltage to increase the speed at which the electricity travels.
- D** It increases the voltage to reduce energy loss in the cables.

- 14 A current-carrying wire XY lies in the magnetic field between the two poles of a U-shaped electromagnet. A force acts on the wire XY because of the magnetic field.



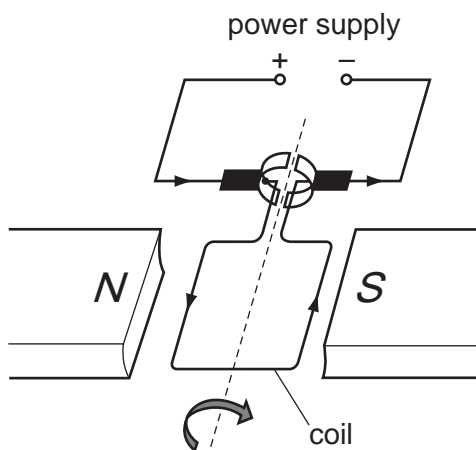
Each of the following actions is carried out separately.

- The current in the wire XY is reversed.
- The magnetic field is reversed.
- Both the current in the wire XY and the magnetic field are reversed at the same time.

How many of these actions cause the direction of the force on the wire XY to be reversed?

- A** 0                      **B** 1                      **C** 2                      **D** 3

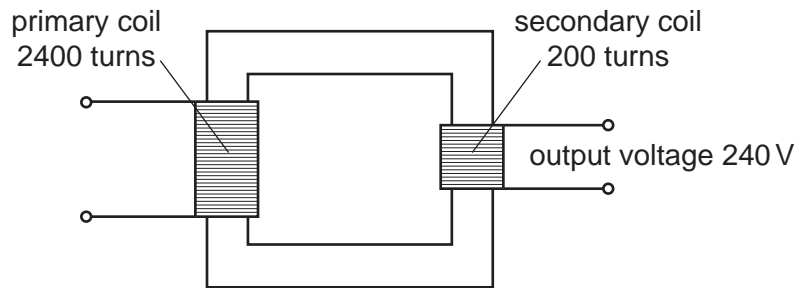
- 15 A current-carrying coil in a magnetic field experiences a turning effect.



How can the turning effect be increased?

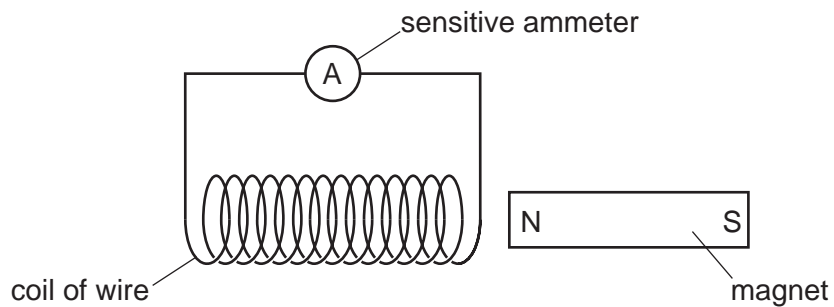
- A** Increase the number of turns on the coil.  
**B** Reduce the size of the current.  
**C** Reverse the direction of the magnetic field.  
**D** Use thinner wire for the coil.

- 16 A transformer has 2400 turns on its primary coil and 200 turns on its secondary coil.



What input voltage is needed to give an output voltage of 240 V?

- A** 12V                      **B** 20V                      **C** 240V                      **D** 2880V
- 17 A student investigates electromagnetic induction. She has a bar magnet and a coil of wire that is connected to a sensitive ammeter.



Which movement does **not** cause a reading on the ammeter?

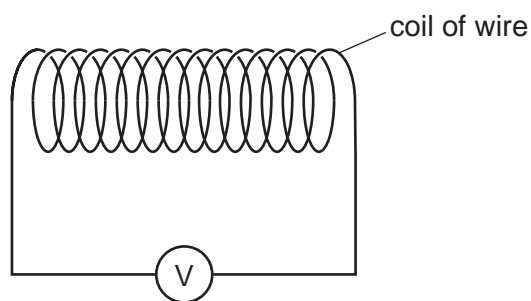
- A** moving the coil to the right  
**B** moving both the magnet and the coil to the left at the same speed  
**C** moving both the magnet and the coil towards each other at the same speed  
**D** moving the magnet to the left



18 Which device uses slip rings?

- A a d.c. electric motor
- B a relay
- C a transformer
- D an a.c. generator

19 The diagram shows a coil of wire connected to a voltmeter.

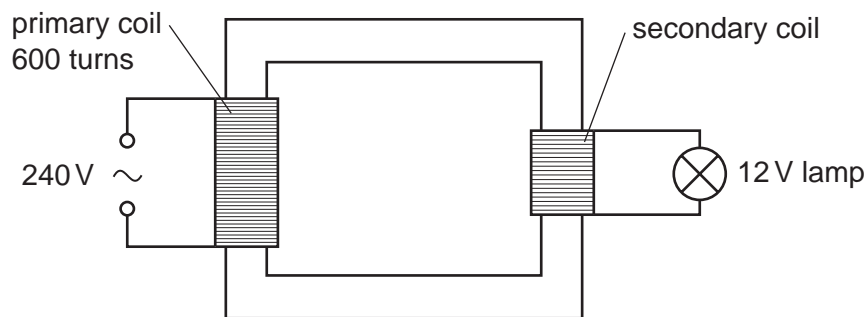


A student has a magnet and an unmagnetised iron rod.

How can an e.m.f. be induced across the coil?

- A holding the magnet inside the coil
- B holding the iron rod inside the coil
- C pushing the magnet into the coil
- D pushing the iron rod into the coil

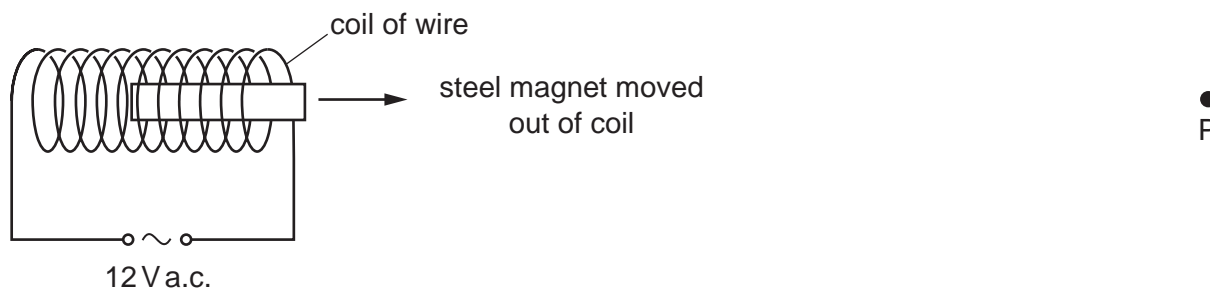
20 A step-down transformer is used to light a 12V lamp from a 240V mains supply. The lamp lights at normal brightness. The primary coil has 600 turns.



How many turns are in the secondary coil?

- A 12
- B 20
- C 30
- D 50

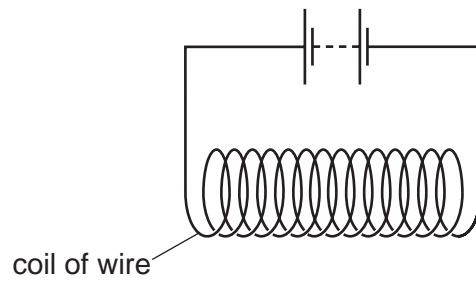
- 21 A steel magnet is placed inside a coil of wire. There is a large alternating current in the coil. The magnet is slowly moved out of the coil to position P.



How has the steel changed, if at all, when it reaches position P?

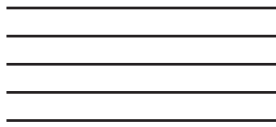
- A** It has become a stronger magnet.
- B** It has become demagnetised.
- C** The poles have changed ends.
- D** There has been no change.

22 An electric current is passed through a coil of wire.

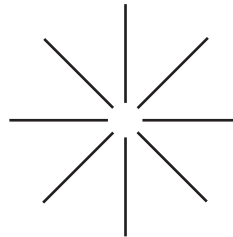


Which diagram shows the shape of the magnetic field produced in the middle of the coil?

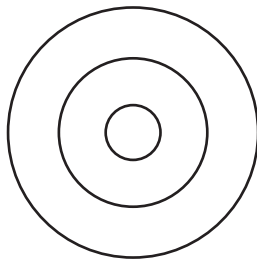
**A**



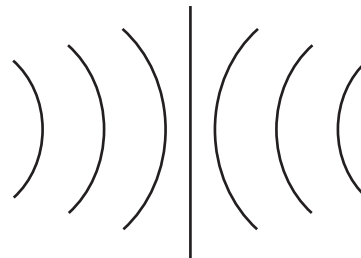
**B**



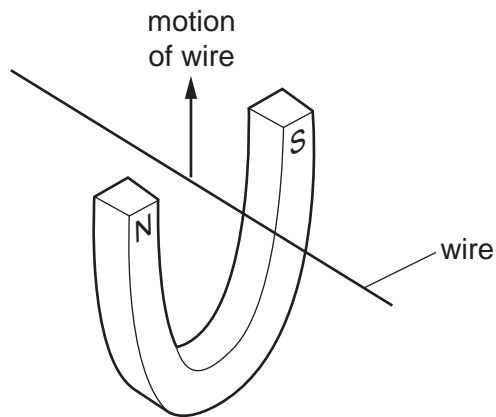
**C**



**D**



- 23 When a wire is moved upwards between the poles of a magnet, an electromotive force (e.m.f.) is induced across the ends of the wire.



Which device uses a moving wire to induce an e.m.f.?

- A** a cathode-ray tube
  - B** a generator
  - C** a transformer
  - D** an electromagnet
- 24 An input voltage of 10V is supplied to the primary coil of a transformer. An output voltage of 40V is produced across the secondary coil.

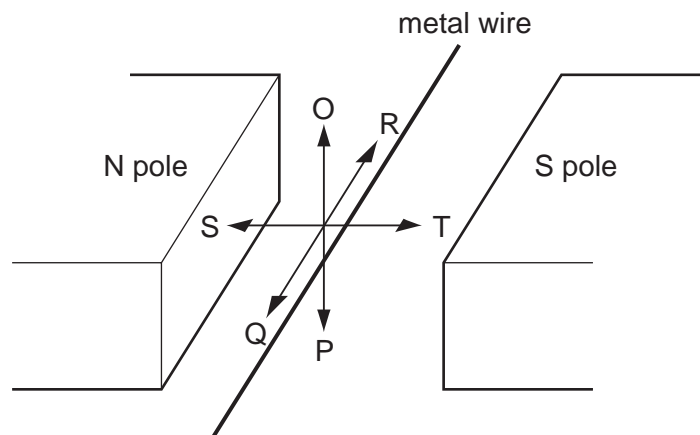
The 10V supply at the primary coil is now replaced with a 40V supply.

What is the new output voltage across the secondary coil?

- A** 10V                      **B** 40V                      **C** 70V                      **D** 160V

25 A metal wire is placed between the poles of a magnet.

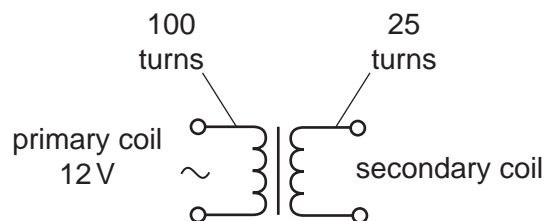
The wire can be moved in each of three directions OP, QR and ST.



In which direction or directions must the wire be moved to induce an e.m.f. across the ends of the wire?

- A** OP only      **B** OP or ST      **C** QR      **D** ST only

- 26 A transformer has 100 turns on its primary coil and 25 turns on its secondary coil. The primary coil is connected to a 12 V a.c. supply.



What is the voltage induced across the secondary coil?

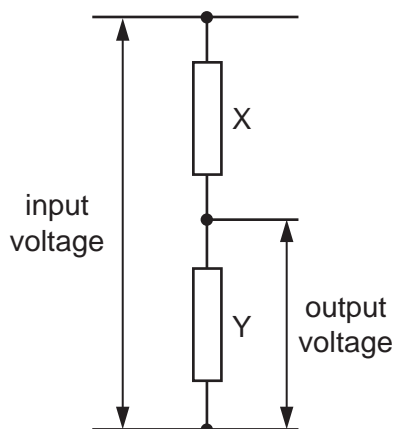
- A** 3.0V      **B** 4.0V      **C** 48V      **D** 300V
- 27 An input voltage of 10V is supplied to the primary coil of a transformer. An output voltage of 40V is produced across the secondary coil.

The 10V supply at the primary coil is now replaced with a 40V supply.

What is the new output voltage across the secondary coil?

- A** 10V      **B** 40V      **C** 70V      **D** 160V

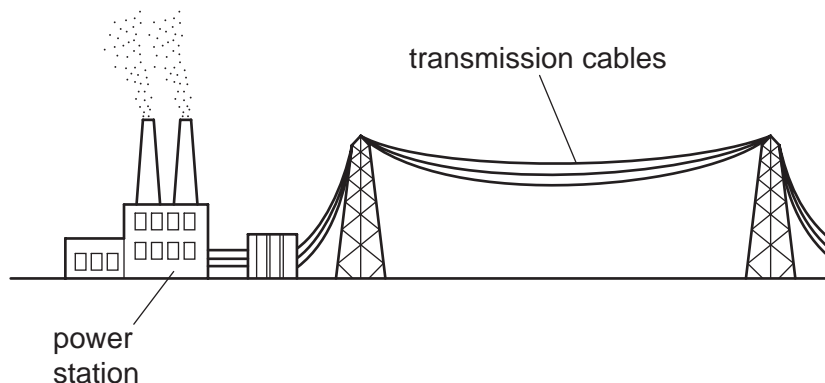
- 28 An engineer uses the potential divider shown in the diagram. He needs the output voltage to be one tenth ( $\frac{1}{10}$ ) of the input voltage.



Which pair of values could he use for the two resistors X and Y?

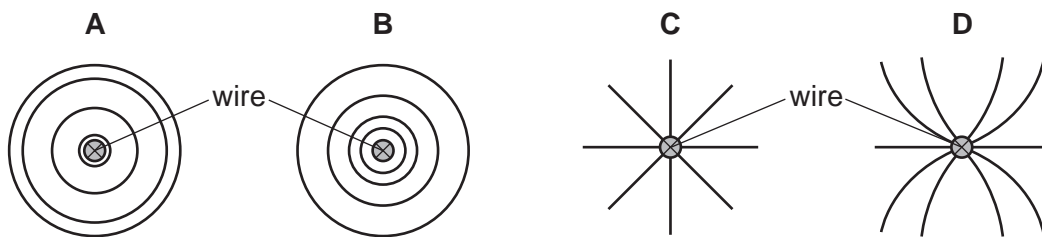
	X / k $\Omega$	Y / k $\Omega$
<b>A</b>	1.0	9.0
<b>B</b>	1.0	10.0
<b>C</b>	9.0	1.0
<b>D</b>	10.0	1.0

- 29 The diagram shows cables used in the transmission of electrical energy. High voltages are used for the transmission.



Why are high voltages used for the transmission of electrical energy?

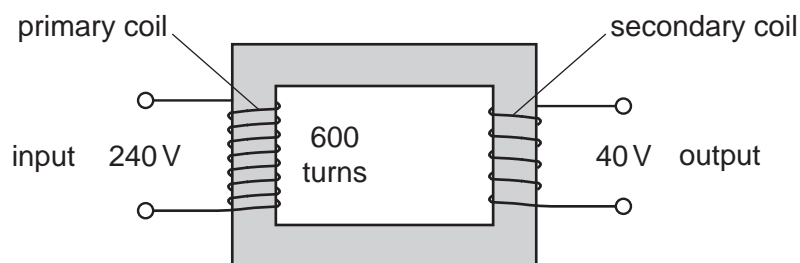
- A Fear of high voltages stops people from interfering with the cables.
  - B Heat loss in the cables is smaller than if low voltages are used.
  - C High voltages increase the current in the cables.
  - D High voltages produce large magnetic fields, so less insulation is needed.
- 30 Which diagram shows the magnetic field pattern around a wire that is carrying a current perpendicular to the page?





31 The diagram shows a simple transformer with an input of 240V and an output of 40V.

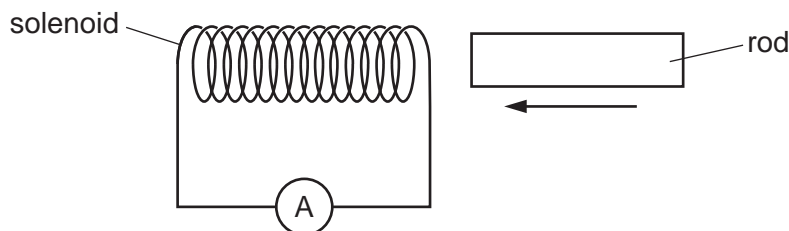
There are 600 turns on the primary coil.



How many turns are there on the secondary coil?

- A** 100                      **B** 320                      **C** 400                      **D** 3600

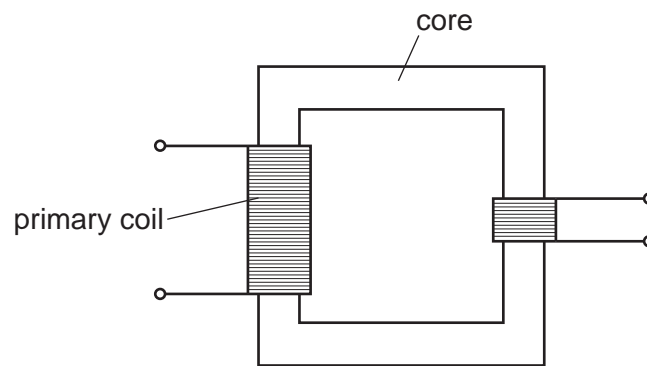
32 A solenoid is connected to a very sensitive ammeter. A rod is inserted into one end of the solenoid. The ammeter shows that there is a small electric current in the circuit while the rod is moving.



Which rod is being inserted?

- A** a heated copper rod  
**B** a magnetised steel rod  
**C** an uncharged nylon rod  
**D** a radioactive uranium rod

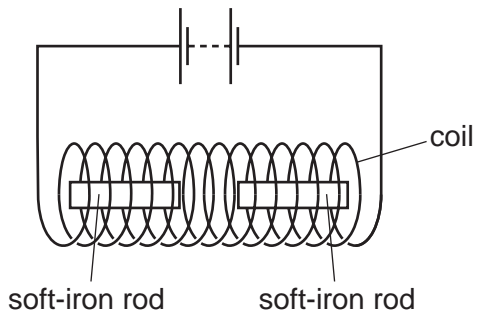
33 The diagram shows the structure of a transformer.



Which row shows a suitable material for the primary coil and a suitable material for the core?

	primary coil	core
<b>A</b>	copper	copper
<b>B</b>	copper	iron
<b>C</b>	iron	copper
<b>D</b>	iron	iron

34 Two soft-iron rods are placed end to end inside a coil which is connected to a battery.

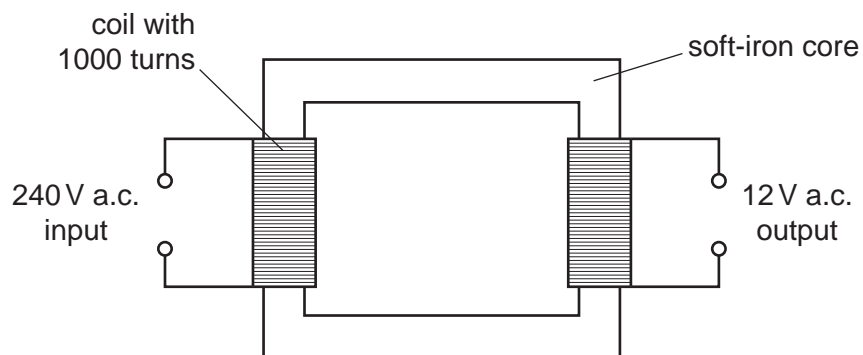


The connections from the battery to the coil are now reversed.

What happens to the soft-iron rods in each case?

	battery connections as shown	battery connections reversed
<b>A</b>	rods attract	rods attract
<b>B</b>	rods attract	rods repel
<b>C</b>	rods repel	rods attract
<b>D</b>	rods repel	rods repel

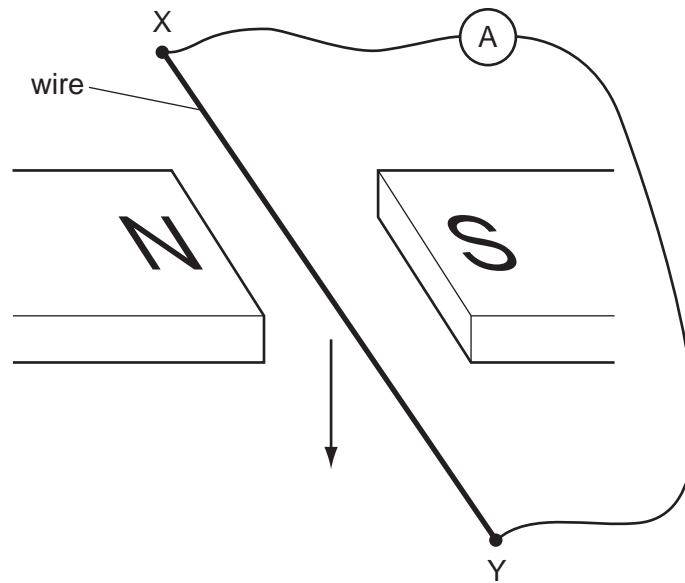
35 The diagram shows a mains transformer that has an output voltage of 12V.



How many turns of wire are in the secondary coil?

- A** 12                      **B** 20                      **C** 50                      **D** 20000

36 The diagram shows an experiment to demonstrate electromagnetic induction.



X and Y are joined, in turn, by four wires, each made of a different material.

Each wire is then moved quickly downwards between the magnets.

Which material will **not** give rise to an induced current in the wire?

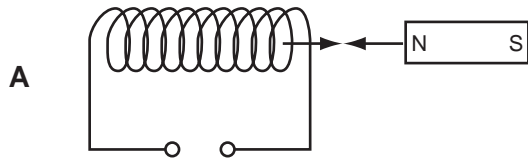
- A aluminium
- B copper
- C iron
- D nylon

37 A toy railway engine is driven around a track by a d.c. electric motor.

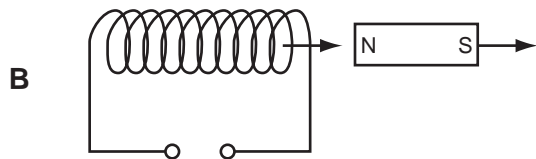
How can the speed of the motor be increased?

- A Use a motor made with fewer turns of wire.
- B Use a smaller d.c. voltage.
- C Use a stronger magnet in the motor.
- D Use the supply with its connections reversed.

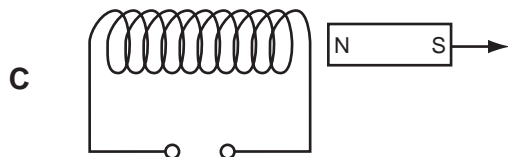
38 Which diagram shows a movement that will **not** produce the changing magnetic field needed to induce an e.m.f. in the coil?



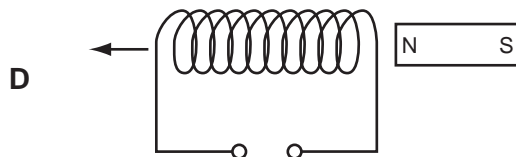
moving a magnet and a coil towards each other at the same speed



moving a magnet and a coil in the same direction at the same speed

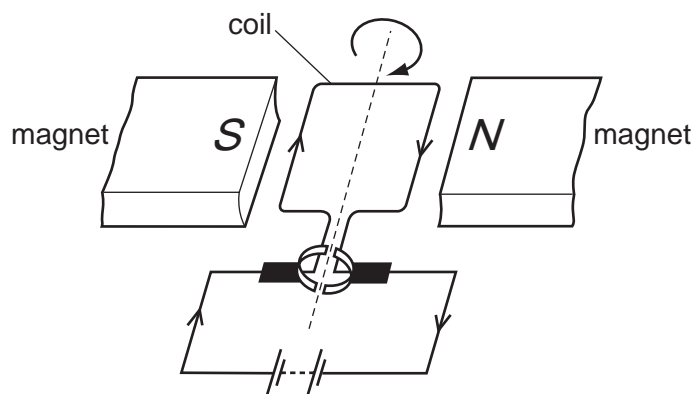


moving a magnet away from a fixed coil



moving a coil away from a fixed magnet

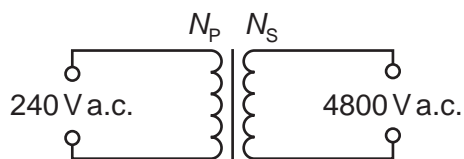
39 The diagram shows a simple d.c. electric motor which is rotating.



Which change will make the motor rotate more quickly?

- A** increasing the number of turns on the coil
- B** removing the magnets
- C** reversing the battery
- D** reversing the polarity of the magnets

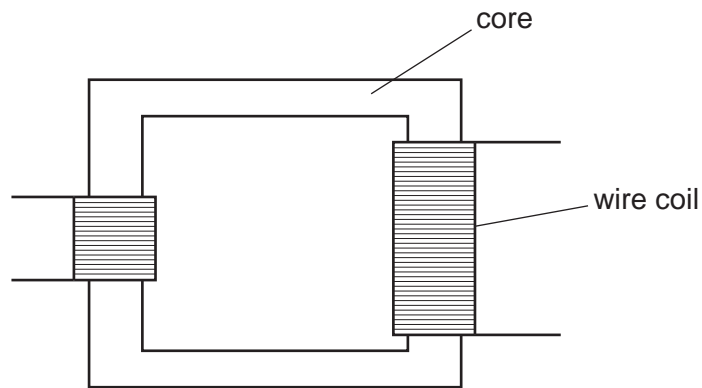
40 A transformer is needed to convert a supply of 240 V a.c. into 4800 V a.c.



Which pair of coils would be suitable for this transformer?

	number of turns on primary coil $N_p$	number of turns on secondary coil $N_s$
<b>A</b>	50	1000
<b>B</b>	240	48 000
<b>C</b>	480	24
<b>D</b>	2000	100

41 The diagram shows a transformer.

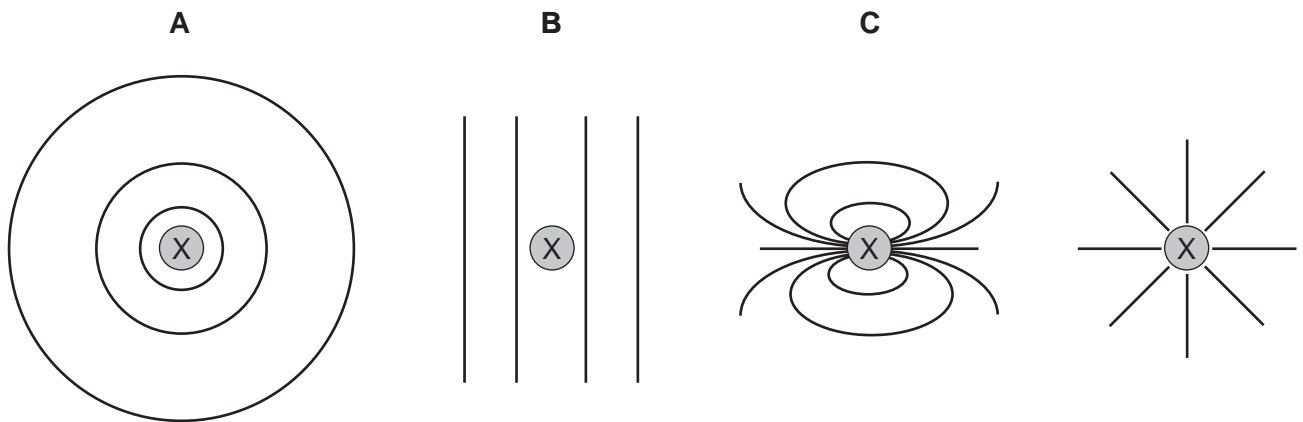


Which materials are suitable to use in its construction?

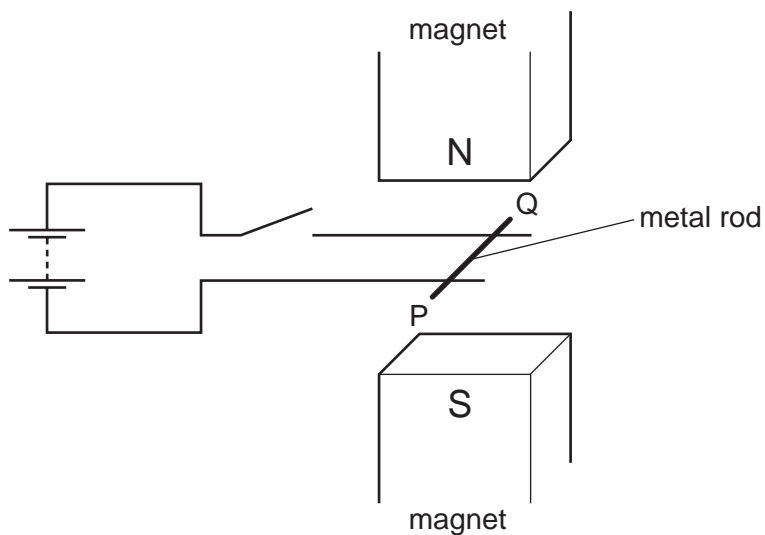
	core	wire coil
<b>A</b>	copper	iron
<b>B</b>	iron	copper
<b>C</b>	steel	copper
<b>D</b>	steel	iron

42 The direction of the current flowing in a straight wire X is into the paper.

Which diagram shows the shape of the magnetic field pattern around the wire?



- 43 A metal rod PQ rests on two horizontal metal wires that are attached to a battery. The rod lies between the poles of a magnet.



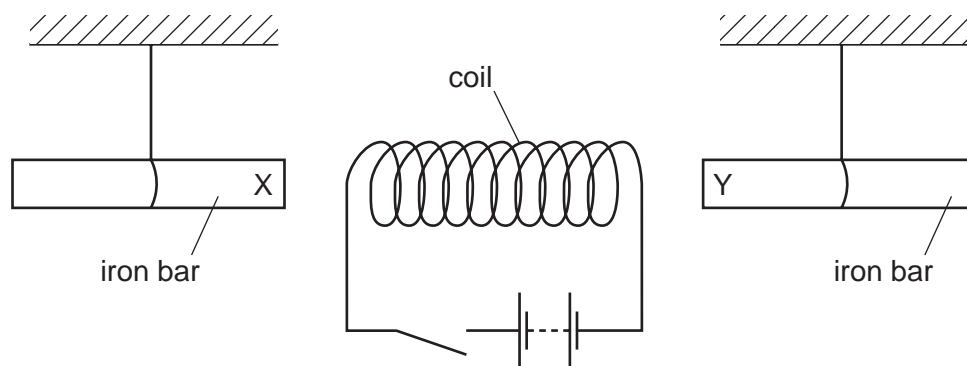
When the switch is closed, the rod moves to the right.

What could be changed so that the rod moves to the left?

- A Open the switch.
- B Reverse the battery terminals and exchange the poles of the magnet.
- C Reverse the battery terminals but without exchanging the poles of the magnet.
- D Turn the metal rod around (P and Q exchanged).



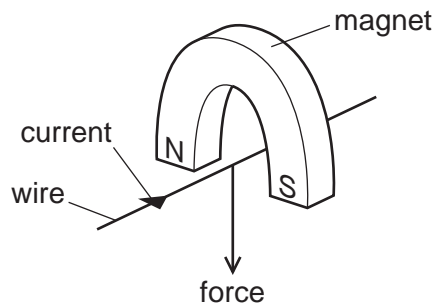
- 44 The diagram shows a coil connected to a battery and a switch. Two unmagnetised iron bars hang freely near opposite ends of the coil.



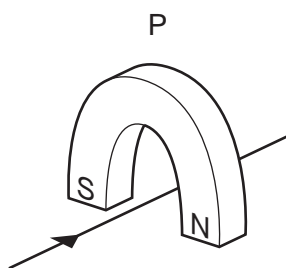
What happens to the iron bars when the switch is closed?

- A** Both X and Y move away from the coil.
- B** Both X and Y move towards the coil.
- C** X moves towards the coil, Y moves away from the coil.
- D** Y moves towards the coil, X moves away from the coil.

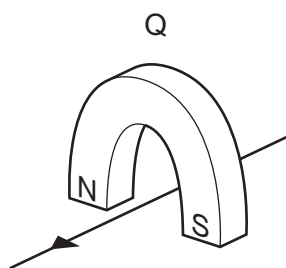
- 45 A wire passes between the poles of a horseshoe magnet. There is a current in the wire in the direction shown, and this causes a force to act on the wire.



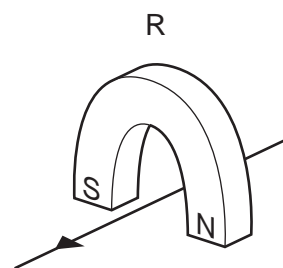
Three other arrangements, P, Q and R, of the wire and magnet are set up as shown.



magnet turned around



current direction reversed

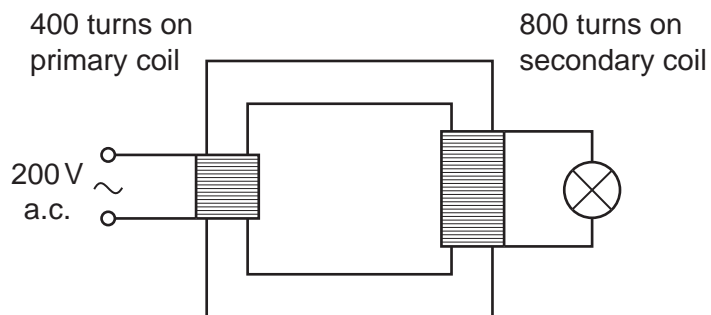


current direction reversed and magnet turned around

Which arrangement or arrangements will cause a force in the same direction as the original arrangement?

- A** P, Q and R    **B** P and Q only    **C** P only    **D** R only

- 46 The diagram shows a transformer. The input voltage and the number of turns on each coil are shown.



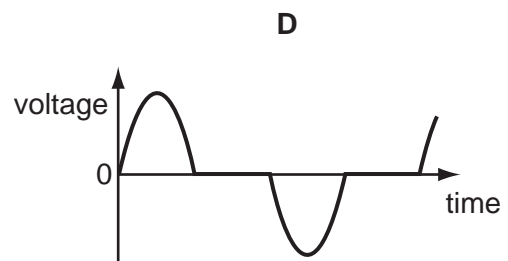
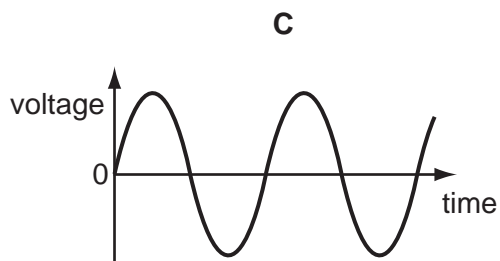
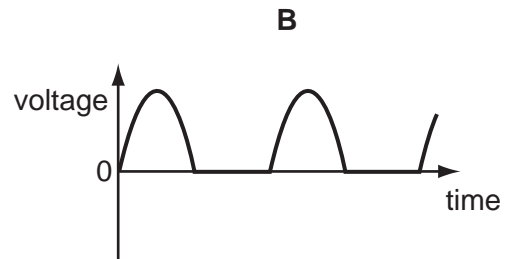
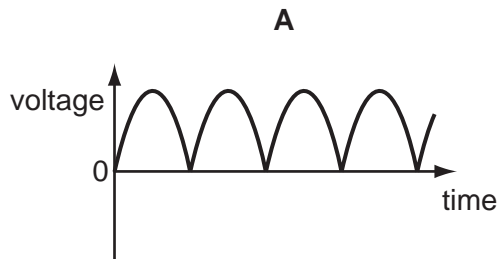
What is the output voltage?

- A** 100V    **B** 200V    **C** 400V    **D** 800V

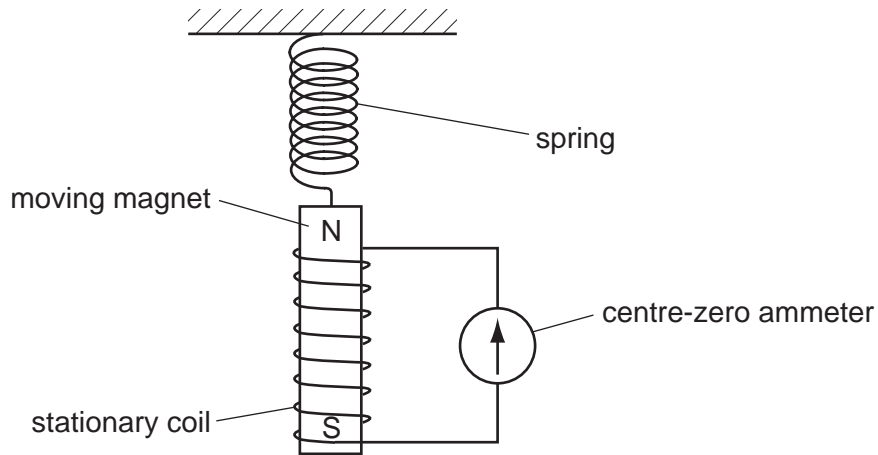
47 Which device uses slip rings?

- A** a cathode-ray tube
- B** a d.c. motor
- C** an a.c. generator
- D** a solenoid

48 Which graph shows how the output voltage varies with time for a simple a.c. generator?



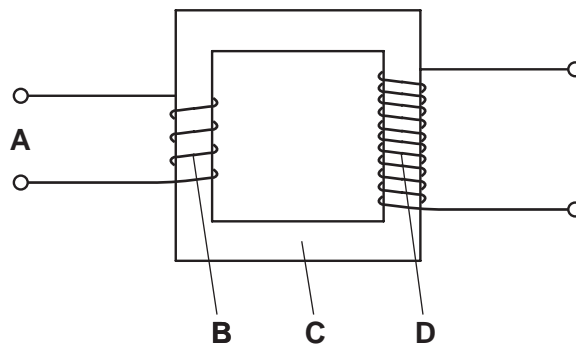
- 49 A magnet is suspended from a spring so that it can move freely inside a coil. The coil is connected to a sensitive centre-zero ammeter.



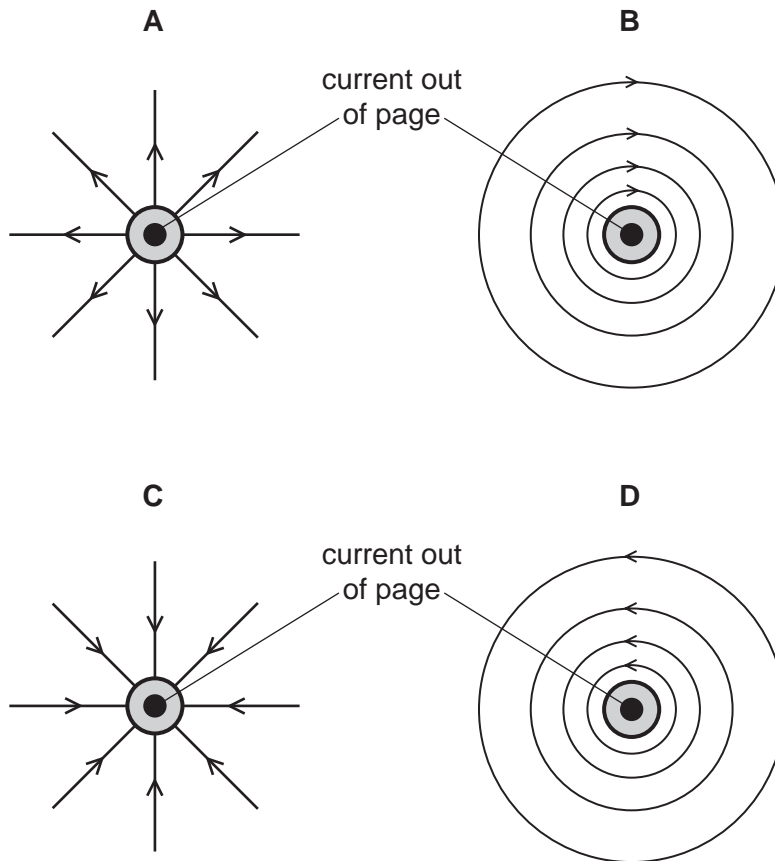
What does the ammeter show when the magnet repeatedly moves slowly up and down?

- A** a reading constantly changing from left to right and right to left
  - B** a steady reading to the left
  - C** a steady reading to the right
- 50 The diagram shows a simple step-down transformer used to decrease a voltage.

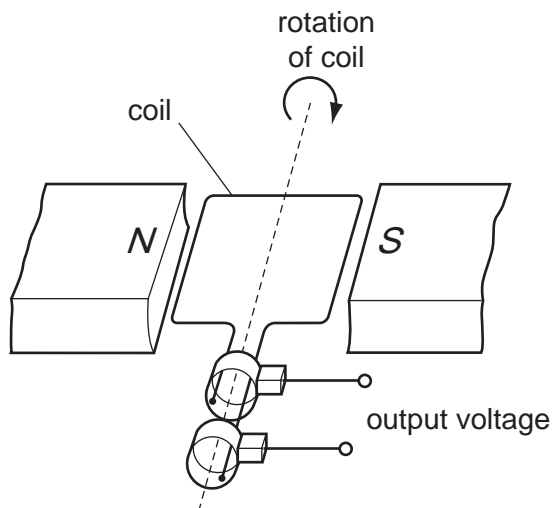
Which part is the primary coil?



51 Which diagram represents the direction of the magnetic field around a straight wire carrying a current out of the page?



52 The diagram shows an a.c. generator.

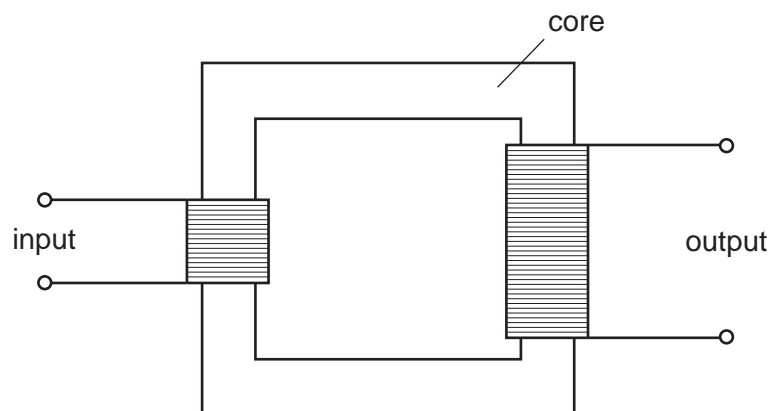


With the coil in the position shown, the output voltage is +10V.

When does the output voltage become -10V?

- A when the coil has turned  $90^\circ$
- B when the coil has turned  $180^\circ$
- C when the coil has turned  $270^\circ$
- D when the coil has turned  $360^\circ$

53 The diagram shows a simple transformer.



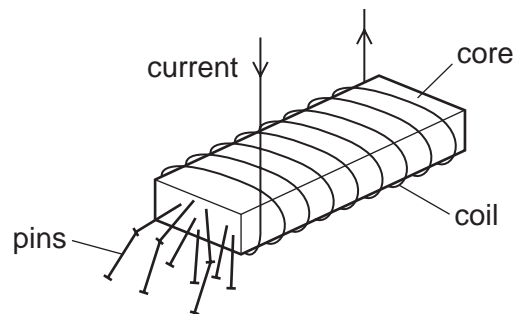
From which material should the core be made?

- A aluminium
- B copper
- C iron
- D steel

54 What is an electric field?

- A** a region around a wire carrying an electric current in which a compass needle experiences a force
- B** a region in which an electric charge experiences a force
- C** a region in which an electric charge is attracted by the Earth's gravity
- D** a region through which electromagnetic radiation is passing

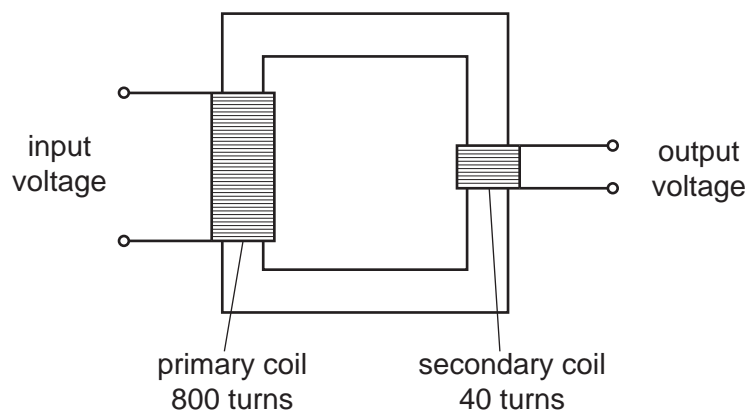
55 A strong electromagnet is used to attract pins.



What happens when the current in the coil is halved?

- A** No pins are attracted.
- B** Some pins are attracted, but not as many.
- C** The same number of pins is attracted.
- D** More pins are attracted.

56 The diagram shows a transformer.



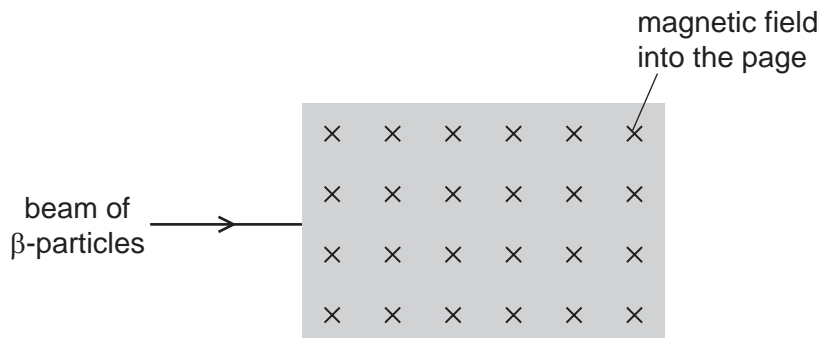
The input voltage is 240V.

What is the output voltage?

- A** 6.0V      **B** 12V      **C** 20V      **D** 40V

57 The diagram shows a shaded area where the direction of a magnetic field is into the page.

A beam of  $\beta$ -particles enters the field as shown.



In which direction is the beam of  $\beta$ -particles deflected as they enter the magnetic field?

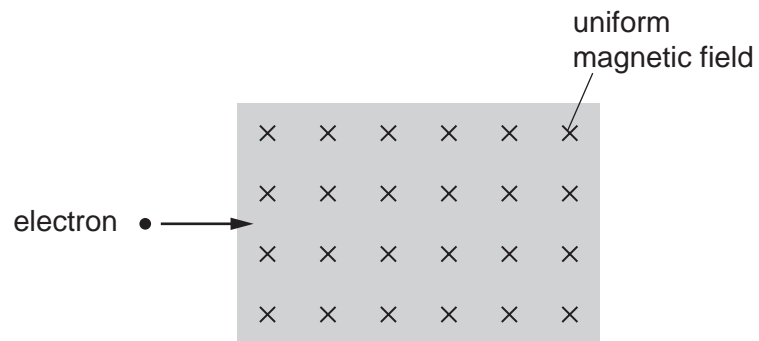
- A** into the page  
**B** out of the page  
**C** down the page  
**D** up the page



58 An electron moves into a uniform magnetic field.

The arrow shows the initial direction of motion of the electron.

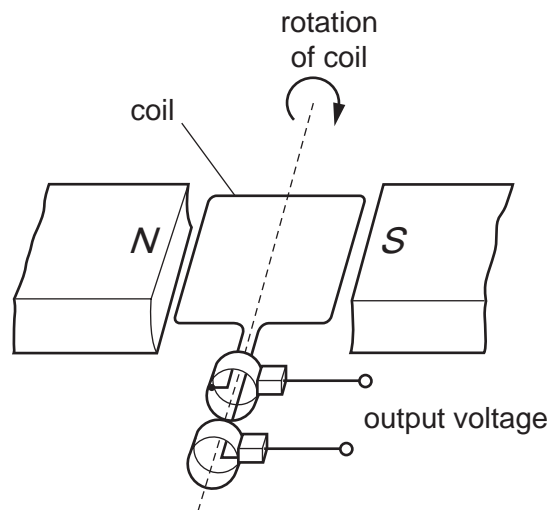
The direction of the magnetic field is into the plane of the page (away from you).



In which direction does a force act on the electron when it enters the magnetic field?

- A** into the page
- B** out of the page
- C** towards the bottom of the page
- D** towards the top of the page

59 The diagram shows an a.c. generator.

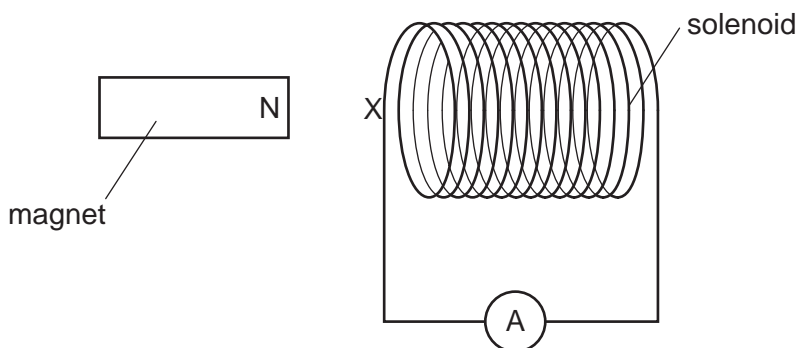


As the coil passes through the position shown, the output voltage is +10V.

When does the output voltage become -10V?

- A** when the coil has turned through  $90^\circ$
- B** when the coil has turned through  $180^\circ$
- C** when the coil has turned through  $270^\circ$
- D** when the coil has turned through  $360^\circ$

- 60 A solenoid is connected in series with a sensitive ammeter. The N pole of a magnet is placed next to one end of the solenoid, marked X.

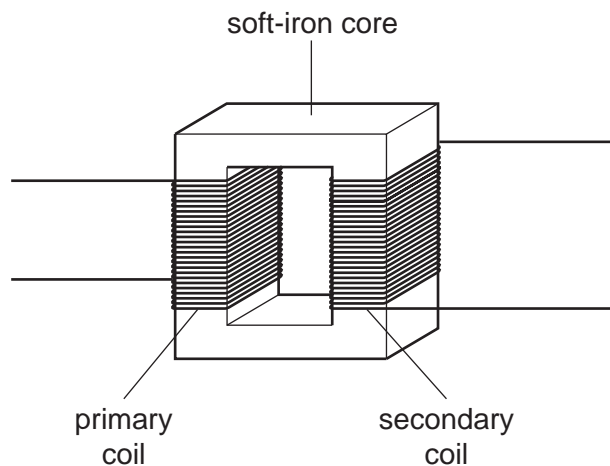


First, the N pole of the magnet is pushed towards X, then the magnet is pulled away from X. During both stages the ammeter deflects.

Which type of magnetic pole is induced at X during these two stages?

	as N pole moves towards X	as N pole moves away from X
<b>A</b>	N pole	N pole
<b>B</b>	N pole	S pole
<b>C</b>	S pole	N pole
<b>D</b>	S pole	S pole

61 The diagram shows a transformer.

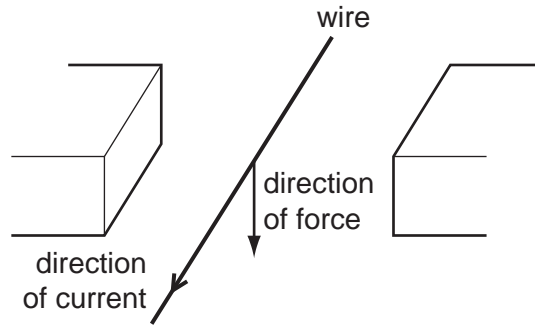


Which row describes the magnetic field in the soft-iron core and the magnetic field in the secondary coil when the transformer is operating?




	magnetic field	
	in soft-iron core	in secondary coil
<b>A</b>	changing	changing
<b>B</b>	changing	constant
<b>C</b>	constant	changing
<b>D</b>	constant	constant

62 The diagram shows a wire placed between two magnetic poles of equal strength.

A current passes through the wire in the direction shown. The current causes a downward force on the wire.



What is the arrangement of the magnetic poles?

- A 
- B 
- C 
- D 