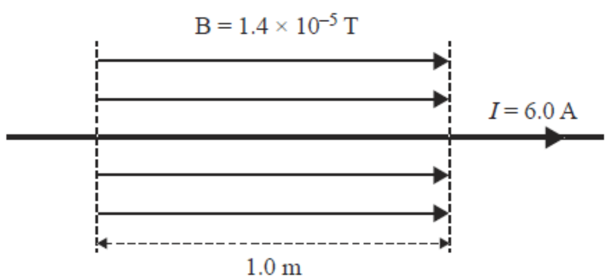
22 2021 Question 2c, 2 marks

The current carrying coil has a radius of 5.0 cm and 20 turns of wire, and it carries a clockwise current (I) of 2.0 A. Its magnetic field strength (B) is 200 mT. Calculate the magnitude of the force, F, acting on the current carrying coil. Show your working.

A wire carrying a current, I, of 6.0 A passes through a magnetic field, B, of strength 1.4×10^{-5} T, as shown below. The magnetic field is exactly 1.0 m wide.



23 2021 NHT Question 1, 1 mark

The magnitude of the force on the wire is closest to

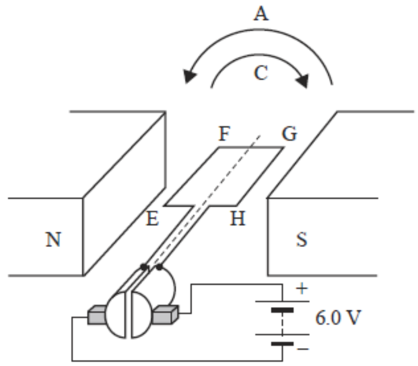
A. 0 N

B. 2.3×10^{-6} N

C. 8.4×10^{-5} N

D. 4.3×10^{5} N

Students build a model of a simple DC motor, as shown below.



36 2018 Question 3a, 3 marks

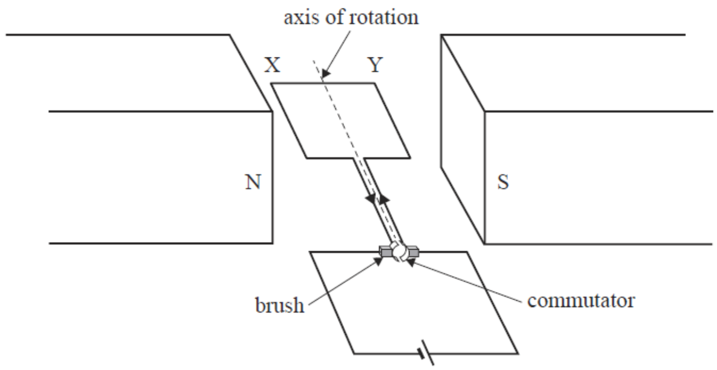
The motor is set with the coil horizontal, as shown, and the power source is applied.
Will the motor rotate in a clockwise (C) or anticlockwise (A) direction? Explain your answer.

37 2018 Question 3b, 2 marks

One student suggests that slip rings would be easier to make than a commutator and that they should use slip rings instead.

Explain the effect that replacing the commutator with slip rings would have on the operation of the motor, if no other change was made.

Students build a simple electric motor, as shown below.



47 2016 Question 14a, 1 mark

At what position(s) (**A.–D.**) of the rotating coil is the magnetic force on the side XY zero? One or more answers may be selected.

A. horizontal with the current as shown above

B. horizontal with the current in the opposite direction to that shown above

C. vertical

D. at all orientations of the coil

48 2016 Question 14b, 2 marks

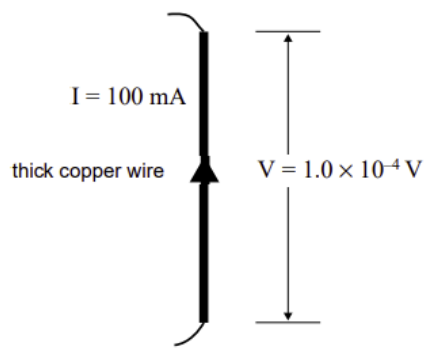
The students discover that the motor starts moving more easily with the coil in some orientations than in others.
Explain the best orientation(s) for starting the motor to move from rest.

The ends of the coil are connected to the commutator, as shown above, so that it is free to rotate with the coil.

84 2002 Question 13, 3 marks

Explain
• why the commutator must be free to rotate in this manner
• how this is fundamental to the operation of the DC electric motor.

A DC current of 100 mA flows in a thick copper wire.
The voltage across the ends of the wire is 1.0×10^{-4} V

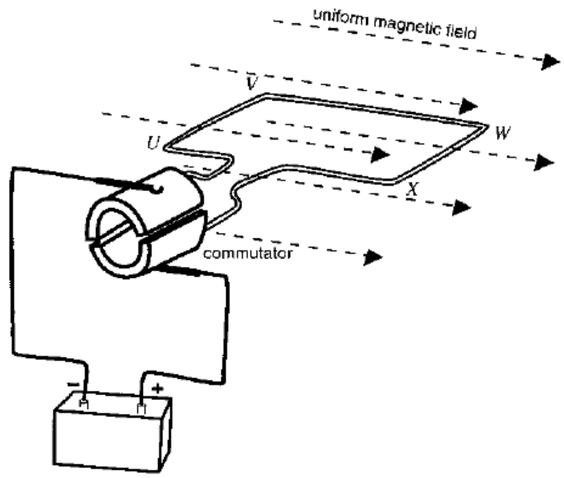


85 2001 Question 1, 2 marks

What is the resistance of the thick copper wire?

86 2001 Question 2, 2 marks

How many electrons enter the copper wire each second? An electron has a charge of 1.60×10^{-19} C.



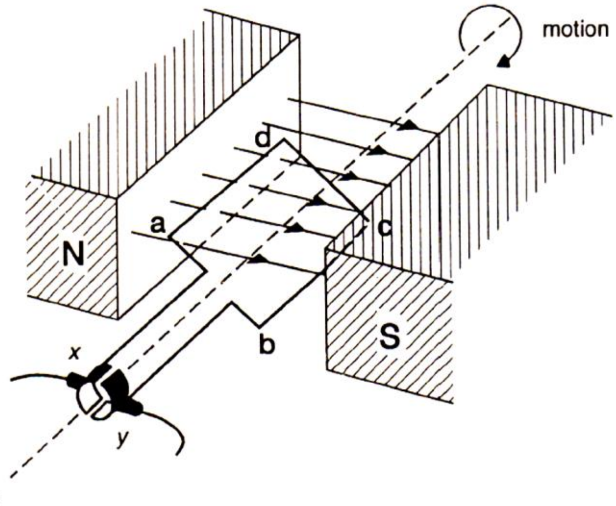
106 1995 Question 9, 1 mark

With the coil oriented as shown above, what is the magnitude of the force on side VW of the coil?

107 1995 Question 10, 3 marks

Describe the principles of operation of the simple motor shown above. In your answer discuss the direction of rotation, the purpose of the commutator, and the way the twisting effects of the forces depends on the coil orientation.

The diagram below shows a model motor, with a split-ring commutator.



A battery is connected between X and Y, (see figure above). The coil then rotated continuously in one direction.

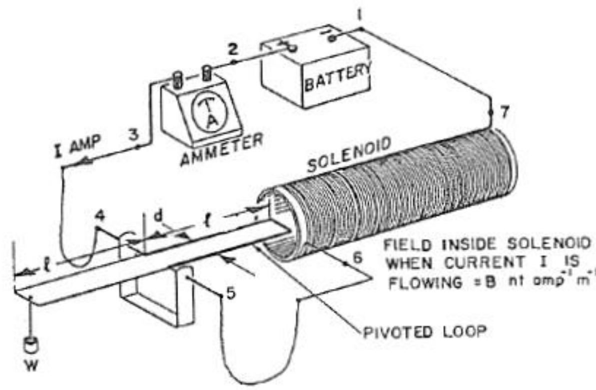
112 1993 Question 4, 2 marks

Explain how the split-ring commutator enables the motor to rotate always in the same direction.

113 1993 Question 5, 1 mark

How should the terminals of the battery be connected to X and Y to make the coil rotate clockwise as viewed from Z?

A device which can be used to calibrate ammeters consists of a pivoted loop of wire inserted into a solenoid. The magnetic forces are counter-balanced by a weight W newton.



124 1969 Question 88, 1 mark

The magnetic force on the U-shaped part of the loop when it is placed inside the solenoid is given by

A. IdB.

B. I*L*B.

C. I(2*L* + d) B.

D. I*L*dB.

E. 2I*L*B.

A student connects the loop and solenoid in series to the same battery, by making the connections shown in the diagram.

125 1969 Question 89, 1 mark

He finds that the magnetic force is in the wrong direction. Which connections could he interchange to reverse the force?

A. 1 and 2.

B. 1 and 3.

C. 4 and 5.

D. 4 and 7.

With the apparatus working correctly. it is found that a current of I ampere requires a weight of W newton to balance the loop.

126 1969 Question 90, 1 mark

If the current is then doubled the balance weight required will be :

A. W.

B. 2W.

C. 4W.

D. $\frac{W}{2}$

E. $\frac{W}{4}$