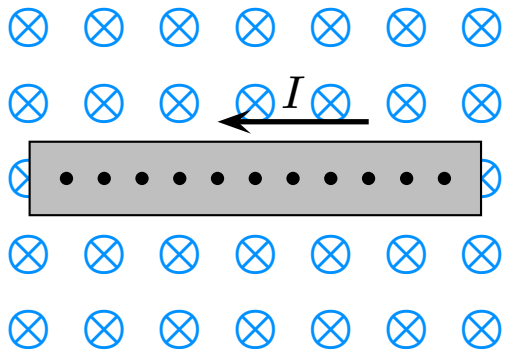
Question 1

A current flows through wire in the indicated direction. The wire is placed in the indicated magnetic field.

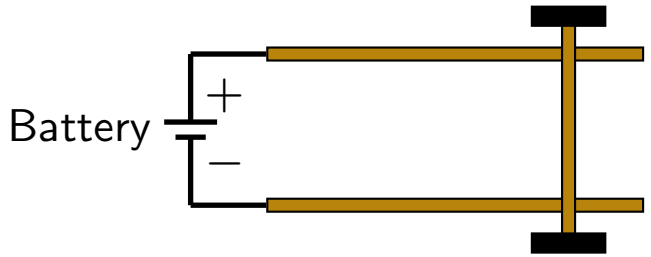


Which of the following describes the direction of the force exerted on the wire?

1. $\uparrow$ if the charges are positive and $\downarrow$ if the charges are negative,
2. $\uparrow$ if the charges are positive and $\uparrow$ if the charges are negative,
3. $\downarrow$ if the charges are positive and $\uparrow$ if the charges are negative,
4. $\downarrow$ if the charges are positive and $\downarrow$ if the charges are negative, or
5. Not enough info/none of the above.

Question 2

A non-magnetic axle with two wheels is free to roll along two rails. The rails are connected to a battery and this is illustrated from above. The north pole of a magnet is held above the axle.



The axle is initially at rest and is then released. Which of the following is true after the wheel is released?

1. It remains stationary.
2. It lifts off the rails.
3. It rolls left.
4. It rolls right.
5. It slides down to the lower rail.

Warm Up Question 1

The cord that connects a household appliance to the mains outlet consists of two strands of wire that run parallel to each other. At any instant the current in one strand is opposite to that in the other strand. Describe the direction of the force exerted by one strand on the other. In household circuits, the currents in the strands simultaneously reverse direction many times every second. Does this change the direction of the force exerted by one strand on the other? Explain your answer.

1. It could be attractive or repulsive. It would change as the current direction changes.
2. The force will be along the direction of the current. It would change as the current direction changes.
3. The two currents cancel. There will be no net force.
4. The two forces cancel. There will be no net force.
5. They always repel. Opposite currents repel.

Warm Up Question 2

A rectangular loop of the type illustrated in Fig 29.48 lies perpendicular to a uniform magnetic field. The loop carries a constant current. Is the net force on the loop zero or non-zero? Explain your answer.

1. Zero. Forces on the opposite sides cancel.
2. Non-zero. A field will always exert a force on a current.