1. Two north poles are brought together. They:

   ☐ attract

   ☐ repel

   ☐ merge into one pole

   ☐ do nothing

2. A 2 C charge moves at 3 $\frac{\text{m}}{\text{s}}$ across a 4 T field (right angles). What force does it feel, in N?

   _____ N

3. A straight 0.5 m wire carries 4 A perpendicular to a uniform 2 T field. What force does it feel, in N?

   _____ N

4. The flux through each turn of a 100-turn coil changes by 0.02 Wb in 0.5 s. What is the magnitude of the average induced EMF, in volts?

   _____ V

5. Outside a magnet, field lines point:

   ☐ from north to south

   ☐ from south to north

   ☐ straight up

   ☐ randomly

6. The magnetic force on a moving charge is directed:

   ☐ along the field

   ☐ perpendicular to both velocity and field

   ☐ opposite the velocity

   ☐ along the velocity

7. A straight wire of length L carries current I perpendicular to a uniform field B. What is the force magnitude?

   ☐ $F = ma$ only

   ☐ $F = BIL$

   ☐ $F = qvB$

   ☐ $F = IR$



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   ☐ a large resistance

   ☐ a changing magnetic flux

   ☐ a steady magnetic field

   ☐ a stationary magnet inside it

9. You can cut a bar magnet to obtain a single, isolated north pole.

   ☐ True ☐ False

10. A stationary charge in a magnetic field feels the maximum magnetic force.

    ☐ True ☐ False

1. **repel**

   Like poles repel, just as like charges do.

2. **24 N**

   $F = qvB = 2 \times 3 \times 4 = 24$ N.

3. **4 N**

   $F = BIL = 2 \times 4 \times 0.5 = 4$ N.

4. **4 V**

   $|\varepsilon| = N\Delta\Phi/\Delta t = 100 \times 0.02/0.5 = 4$ V.

5. **from north to south**

   Outside a magnet, field lines run from the north pole to the south pole.

6. **perpendicular to both velocity and field**

   The force is perpendicular to both the velocity and the field.

7. $F = BIL$

   $F = BIL$ – the motor-effect force on a current.

8. **a changing magnetic flux**

   Only a changing flux induces an EMF; a steady field does nothing.

9. **False**

   Poles always come in pairs; each piece of a cut magnet has both N and S.

10. **False**

    False. The magnetic force needs motion: $F = qvB\sin\theta$ is zero when $v = 0$.



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