Question:

A rectangular coil of dimensions 20cm by 15cm lies with its plane parallel to a magnetic field of 0.5W/m2. The coil, carrying a current of 10A experiences a torque of 4.5Nm in the field. How many loops have the coil?

a. 100

b. 60

c. 30

d. 20

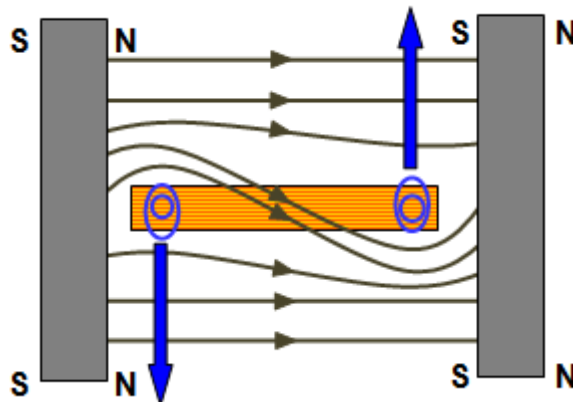**Answer:**

Ampère's force law for one side:

$$F = IBa$$

where a is side's length of coil, B is magnetic field, I current.

Considering that we have 2 sides and N loops:

$$F = 2IBaN$$

Therefore torque equals:

$$M = 2IBaN\frac{b}{2} = IBNab$$

And number of loops:

$$N = \frac{M}{IBab} = 30$$

Answer: 30