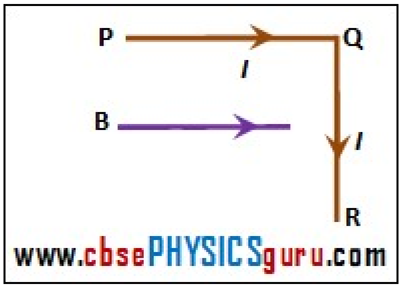
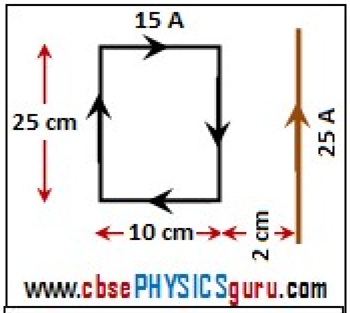
FORCE ON CURRENT CARRYING CONDUCTORS

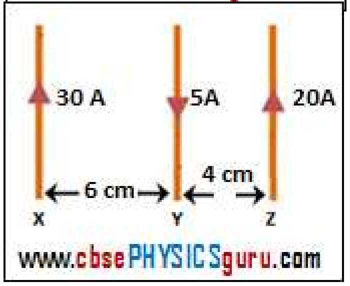
1. A straight horizontal conducting rod of length 5 and mass 50 g is suspended by two vertical wires ends. A current of 5.0 A is set up in the rod through the wires. What magnetic field should be set up normal to the conductor in order that the tension in the wires is zero? (Take g = 10 m/s^2):
   (a) 0.5 T (b) 0.3 T **(c)** 0.2 T (d) 0.1 T
2. Uniform magnetic field B is directed vertically upwards and 3 wires of equal length L, carrying equal current I are lying in a horizontal plane such that the first one is along north, second one along north-east and the third one is at 60^0 north of east. Force exerted by magnetic field B on them is:
   (a) zero on the first (b) 2 BIL on the second (c) $\sqrt{3}$BIL on the third **(d)** BIL on all of them
3. A closed loop lying in the xy plane carries a current. If a uniform magnetic field B is present in the region, the force acting on the loop will be zero, if B is in:
   (a) the y-direction (b) the z-direction (c) the x-direction **(d)** any of the above directions
4. A wire PQR is bent as shown in figure and is placed in a region of uniform magnetic field B. The length of PQ = QR = L. A current I ampere flows through the wire as shown. The magnitude of force on PQ and QR will be:
   (a) BIL, BIL **(b)** 0, BIL (c) BIL, 0 (d) 0, 0



5. A straight wire of length 4 m carries a current of 10 A. If this wire is placed in a uniform magnetic field of 0.10 T making an angle of 45° with the magnetic field, the applied force on the wire will be:
   (a) $2\sqrt{2}$ N (b) $3\sqrt{2}$ N (c) $2\sqrt{3}$ N (d) 4 N
6. A straight current carrying conductor is kept along the axis of circular loop carrying current. The force exerted by the straight conductor on the loop is:
   (a) perpendicular to the plane of the loop (b) in the plane of the loop, away from the center (c) in the plane of the loop, towards the center **(d)** zero
7. The force between two parallel current carrying wires is independent of:
   (a) their distance of separation (b) the length of the wires (c) the magnitude of currents **(d)** the radii of the wires
8. A rectangular current carrying loop placed 2 cm away from a long, straight current carrying conductor as shown in figure. The correct statement related to net force experienced by the loop due to wire is:
   (a) repulsive in nature having magnitude equal to 7.8 × 10^{-4} N (b) repulsive in nature having magnitude equal to 3.8 × 10^{-4} N (c) attractive in nature having magnitude equal to 7.8 × 10^{-4} N (d) attractive in nature having magnitude equal to 2.6 × 10^{-4} N

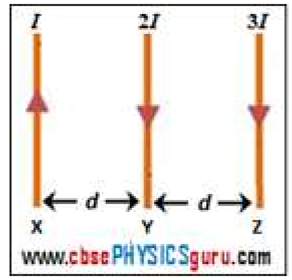


9. Three long, straight parallel wires X, Y and Z carrying current, are arranged as shown in figure. The force experienced by a 25 cm length of wire Y is:
   (a) 2.5 x 10^{-3} N (b) 2.5 x 10^{-3} N (c) 2.5 x 10^{-3} N **(d)** Zero



10. Two long conductors, separated by a distance d carry current I and 2I in the same direction. They exert a force F on each other. Now the current in one of them is increased to three times and its direction is reversed. The distance is also increased to 2d. The new value of the force between them is:

(a) -3F (b) F/2 **(c)** -3F/2 (d) -2F/3



11. Three long wires X, Y and Z are placed parallel to each other as shown in the figure. The force per unit length of the wire Y due to X and Z is:

(a) $\frac{4\mu_0 I^2}{\pi d}$ (b) $\frac{8\mu_0 I^2}{\pi d}$ (c) $\frac{4\mu_0 I^2}{3\pi d}$ (d) Zero

12. Three long parallel current carrying wires are arranged perpendicular to the plane of the paper as shown in the figure. If same current I passing through each wire, the magnitude of the force per unit length of the wire B is given by:

(a) $\frac{4\mu_0 I^2}{\pi d}$ **(b)** $\frac{\mu_0 I^2}{\sqrt{2}\pi d}$ (c) $\frac{\sqrt{2}\mu_0 I^2}{\pi d}$ (d) $\frac{4\sqrt{2}\mu_0 I^2}{\pi d}$