$$\mathbf{MR = mr}$$

31. **(E)** Since MR = mr,

$$m = \frac{MR}{r} = \frac{(1\,kg)(1.5\,m)}{(0.5\,m)} = \mathbf{3\ kg}$$

32. **(E)** Using $\boldsymbol{\tau} = \mathbf{I}\boldsymbol{\alpha} = \mathbf{Fr}$,

$$\boldsymbol{\alpha} = \frac{\mathbf{F}_{NET}\,r}{I} = \frac{\left[3m(r) - (3m)\,\mathbf{a}\right] - \left[mR + m\mathbf{a}\right]}{I} = \frac{m\left[3(R - \mathbf{a}) - (r + \mathbf{a})\right]}{I}$$

33. **(D)** Using $\mathbf{P} = \frac{\mathbf{W}}{t} = \frac{\mathbf{Fd}}{t} = \frac{(50\,kg)(10\,m/s^2)(50\,m)}{(10\,sec)} = \mathbf{2500\ W}$

34. **(B)** $\mathbf{v}$ at point B is $\mathbf{v_O} \cos 45° = \frac{(2)^{\frac{1}{2}}}{2}\,\mathbf{v_o}$

35. **(B)** Using $\mathbf{p = mv}$,

$$\mathbf{p} = (2\,kg)(\mathbf{v_O} \cos 45°) = \frac{(2)^{\frac{1}{2}}}{2}\,\mathbf{v_o} = (200)\sqrt{2}\ kgm/s$$

$$= 283\ kgm/s = \mathbf{200 - 300\ kgm/s}$$

Electricity and Magnetism

Multiple Choice

36. **(B)** Since the **series** combination of 2 Ω and 3 Ω is in parallel with the 1 Ω resistor,

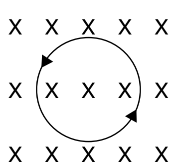
$$\frac{1}{R_{EQ}} = \frac{1}{1\Omega} + \frac{1}{5\Omega} = \frac{6}{5\Omega} \text{ and } \mathbf{R_{EQ}} = \left(\frac{5}{6}\right)\Omega$$

37. **(D)** After passing point A, the current splits inversely to the branch resistance and recombines at point B. Thus, $\frac{5}{6}$ of the main line current passes through the 1 Ω resistor and $\frac{1}{6}$ of the current passes through the 5 Ω branch.

38. **(A)** The 6 A current splits with $\frac{5}{6}$ of it going to the 1 Ω resistor and the remaining $\frac{1}{6}$ of the current going to the branch with both the 2 Ω and 3 Ω resistors.

39. **(B)** Using **V = IR**, the voltage drop through the 3 Ω resistor is $V_{3\Omega} = I_{3\Omega} R_{3\Omega} = (1\ A)(3\ \Omega) = \mathbf{3\ V}$.

40. **(C)** Since the increasing magnetic field is directed into the page, the resulting induced magnetic field that opposes it (according to Lenz's Law) is in the opposite direction. Point the right thumb *out of the page*, and the fingers curl in the *counterclockwise* direction of the resulting induced current in the loop.



41. **(B)** I. Changing magnetic field strength causes a current to flow $\left(\varepsilon = -\frac{\Delta\Phi}{\Delta t}\right)$.

II. Moving the loop up and parallel to the magnetic field does not induce current.