

國立中央大學 109 學年度碩士班考試入學試題

所別：地球科學學系地球物理 碩士班 不分組(一般生)
地球科學學系地球物理 碩士班 不分組(在職生)

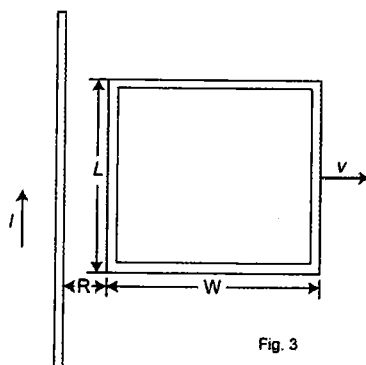
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科目：普通物理學

本科考試禁用計算器

*請在答案卷(卡)內作答

1. A research vessel performs a river survey. The vessel moves downstream with a constant speed 6 m/s relative to the water. The river has a steady current of 1 m/s relative to the ground. Mary sits on the boat and his instrument falls into the river. Five minutes later, she notices that his instrument is missing and immediately turns the boat around, moves upriver with the same speed of 6 m/s relative to the water. How long does it take the man to row back upriver to reclaim his instrument ? (20 %)
2. Suppose you could dig a tunnel into the earth center. This tunnel begins where you stand, passing through the earth center and comes out on the other side of the earth. What would happen to a rock you drop into this tunnel ? (15 %) How long it take the rock to return you ? (Assumes Earth does not rotate and ignore air friction and drag.) (15 %) (total 30 %)
3. A rectangular loop of length L and width W moves at constant velocity v away from a long ,strait wire carrying a current I (Fig. 3). The wire lies in the plane defined by the loop, and the loop's resistance is R . What are the direction and magnitude of the current induced in the loop at the instant the side nearest the wire is a perpendicular distance R away from the wire ? (30 %)



4. A transverse wave pulse traveling along a rope is described by the time-dependent wave function $f(x, t) = Ae^{-(kx-wt)^3}$, with wave number $k = 2\pi s^{-1}$. (a) sketch the time-dependent wave function at $t = 0$ and $t = 5.00 s$. (5 %) (b) sketch the pulse as a function of time at $x = 0$ and $x = 5.00 m$. (5 %) (c) Shat that the function given above satisfies the wave equation. (5 %) (d) What is the wave speed of the pulse (5 %)? (total 20 %)

參考用