

科目：普通物理 適用：應光系二

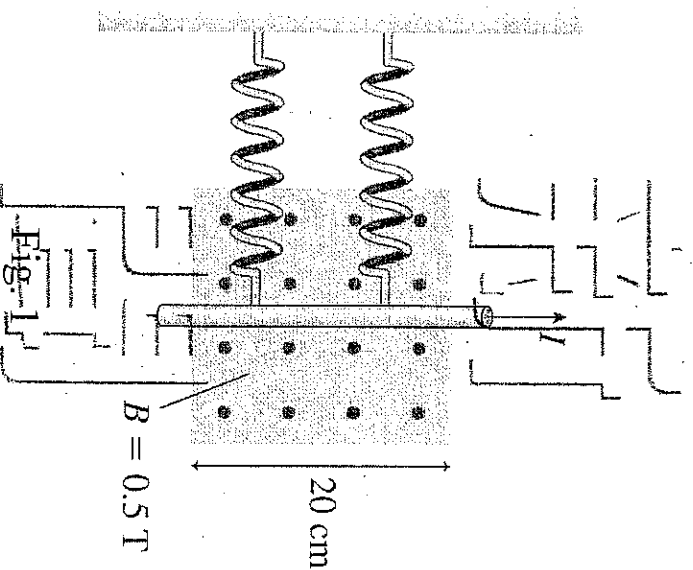
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考生注意：

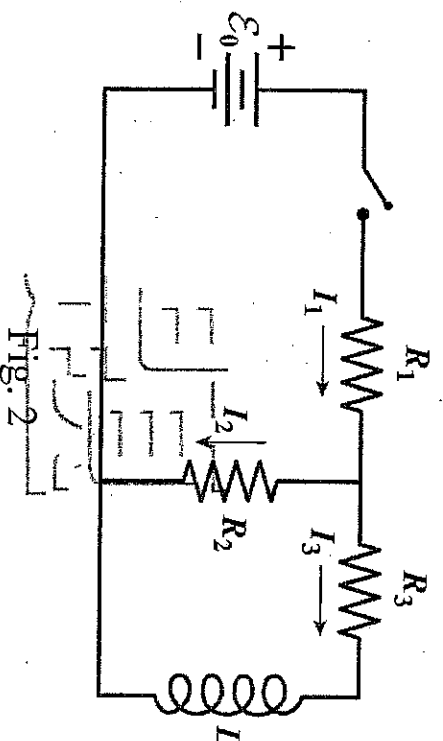
1. 依次序作答，只要標明題號，不必抄題。
2. 答案必須寫在答案卷上，否則不予計分。
3. 限用藍、黑色筆作答；試題須隨卷繳回。

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1. The two springs in Fig. 1 each have a spring constant of 10 N/m . They are stretched by 1.0 cm when a current passes through the wire. How big is the current? (10%)



2. In Fig. 2, $\mathcal{E}_0 = 12 \text{ V}$, $R_1 = 4.0 \Omega$, $R_2 = 8.0 \Omega$, $R_3 = 2.0 \Omega$, and $L = 2.0 \text{ H}$. Find the current I_2 (a) immediately after the switch is first closed and (b) a long time after the switch is closed. (c) After a long time the switch is reopened. Now what's I_2 ? ((a) 5%, (b) 5%, (c) 5%)



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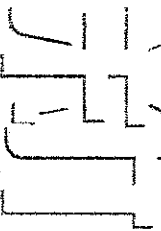
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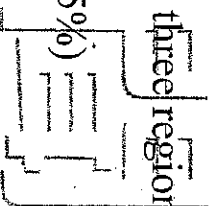
3. A slide projector needs to create a 98-cm-high image of a 2.0-cm-tall slide. The screen is 300 cm from the slide. (a) What focal length does the lens need? Assume that it is a thin lens. (b) How far should you place the lens from the slide? ((a) 5%, (b) 5%)



4. A hollow metal sphere has inner radius a and outer radius b . The hollow sphere has charge $+2Q$. A point charge $+Q$ sits at the center of the hollow sphere.

Determine the electric fields in the three regions (a) $r \leq a$, (b) $a < r < b$, and

- (c) $r \geq b$. ((a) 5%, (b) 5%, (c) 5%)



5. A wave on a string is described by $D(x, t) = (3.0 \text{ cm}) \sin \left[2\pi \left(\frac{x}{2.4 \text{ m}} + \frac{t}{0.20 \text{ s}} + 1 \right) \right]$,

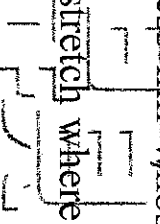
where x is in m and t is in s. (a) In what direction is this wave traveling? (b)

What are the wave speed, (c) the frequency, and (d) the wave number? (e) At $t =$

0.50 s, what is the displacement of the string at $x = 0.20$ m? ((a) 6%, (b) 6%, (c)

6%, (d) 6%, (e) 6%)

6. A child sleds down a frictionless hill whose vertical drop is 7.2 m. At the bottom there is a level but rough stretch where the coefficient of kinetic friction is 0.51. How far does she slide across the level stretch? (10%)



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7. Two forces act on a 3.1-kg mass that undergoes acceleration $\vec{a} = 0.91\hat{i} - 0.27\hat{j} \text{ m/s}^2$. If one of the forces is $\vec{F}_1 = -1.2\hat{i} - 2.5\hat{j} \text{ N}$, what is the other force? (10%)

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