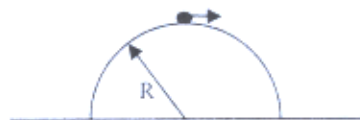


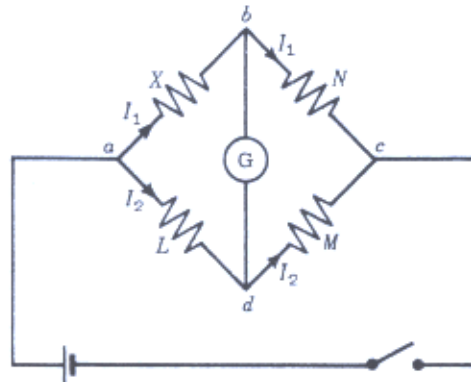
1. (20%)
  - (a) Please state Newton's third law of motion.
  - (b) A man pulls a cart to move on a horizontal surface. If he exerts a force forward, then according to Newton's third law the cart will exert an equal but opposite force backward. So, can the cart move in reality? Explain why.
  
2. (20%)
  - (a) Derive an equation for the trajectory of a particle moving with initial velocity  $v_0$  at an angle  $\theta$  above the horizontal in a uniform gravitational field.
  - (b) For the case of a trajectory over a flat surface, find the optimal initial angle  $\theta$  that leads to the maximum range.
  
3. (20%) A particle initially at rest starts to slide down from the top of a hemispherical mound of ice as shown. Show that the particle leaves the ice at a point whose height is  $2R/3$  if the ice is frictionless.



(背面仍有題目,請繼續作答)

4. (20%)

A unknown resistance  $X$  is being measured by means of a Wheatstone bridge. Resistances  $L$ ,  $M$  and  $N$  shown in the figure are respectively 1000, 5000, and 500 ohms. The voltage meter  $G$  reads zero. Find  $X$ .



5. (20%)

A Pitot tube inserted in a flow as shown. The flowing fluid is air and the manometer liquid is water. Find the flow speed.

