

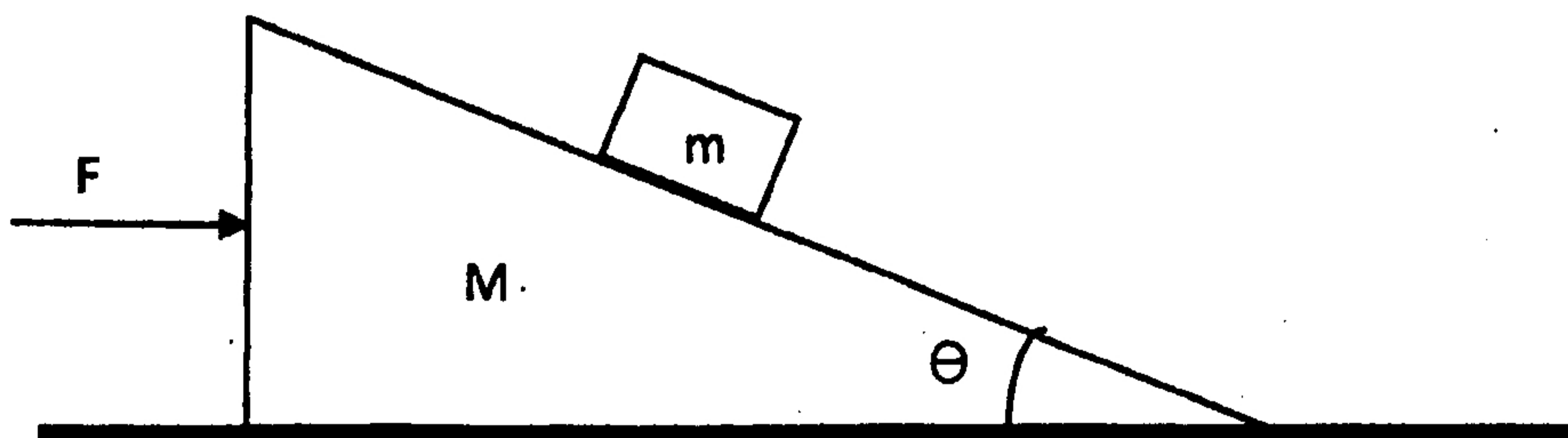
1. (25%)

A radio station transmits a 10-kW signal at a frequency of 100MHz. For simplicity, assume that it radiates as a point source. At a distance of 1 km from the antenna, find: (a) the amplitude of the electric and magnetic field strengths, and (b) the energy incident normally on a square plate of side 10 cm in 5 min.

$$(\mu_0 = 4\pi \times 10^{-7} \text{ H/m}, \epsilon_0 = 8.85 \times 10^{-12} \text{ F/m}, c = 3 \times 10^8 \text{ m/s})$$

2. (25%)

A block of mass $m=0.5\text{kg}$ is on a wedge of mass $M=2\text{kg}$. The wedge is subject to a horizontal force F and slides on a frictionless surface. The coefficient of static friction between block and wedge is 0.6. Find the range of values of F for which the block does not slide on the incline. Take $\theta = 30^\circ$.



(背面仍有題目.請繼續作答)

本試題是否可以使用計算機：可使用，不可使用（請命題老師勾選）

考試日期：0301，節次：2

3. (25%)

Particles $m_1 = 2m$ and $m_2 = m$ can slide without friction on parallel fixed horizontal wires separated by a distance h . A spring of stiffness k and unstressed length h connects the two particles. Particle m_1 has an initial velocity v_0 , m_2 is initially motionless, and the spring is initially unstressed. You can do all work assuming motion in one direction in an inertial reference frame.

- (a) Find the maximum velocity v_2 of m_2 .
- (b) Find the maximum stretch δ in the spring.

4. (25%)

If you start at 50° N latitude, 120° W longitude, fly at 10 km altitude at a speed of 810 km/hr for 11 hours at a constant heading of 60° from true North, where will you end up? (Assume spherical earth with radius 6370 km)