

# Hong Kong Physics Olympiad 2013

2013 香港物理奧林匹克

## Scope of Competition 比賽範圍

The scope of the Hong Kong Physics Olympiad 2013 includes the following topics:

2013 香港物理奧林匹克的比賽範圍涉及以下範疇：

矢量可以是3維的。不要求微積分。

**Vectors can be 3-dimensional. Calculus is not required.**

### 1. 質點的運動 Motion of Point Particles

#### 1.1 勻加速直線運動

Uniformly accelerated linear motion

#### 1.2 勻加速 2 維運動

Uniformly accelerated motion in two dimensions

#### 1.3 勻速圓周運動

Uniform circular motion

#### 1.4 相對運動和參照系

Relative motion and reference frame

### 2. 力學 Mechanics

#### 2.1 力學中常見的力：重力、彈力、摩擦力、拉力，等等

Common forces in mechanics: gravity, elastic force, friction, tension, etc.

#### 2.2 牛頓第一、二、三運動定律

Newton's first, second and third laws of motion

#### 2.3 力矩 Torque

#### 2.4 物體的平衡條件和平衡的種類

Conditions for equilibrium of objects and types of equilibrium

#### 2.5 萬有引力定律

Law of Universal Gravitation

#### 2.6 行星和人造衛星勻速圓周運動

Uniform circular motion of planets and satellites

#### 2.7 慣性系和平動、勻速轉動參照系裏的慣性力

Non-inertial frame and inertial force in translational and constant speed rotational frames

#### 2.8 簡諧振動：振幅，頻率，位相，與位移成正比的回復力

Simple harmonic motion: amplitude, frequency, phase, restoring force proportional to displacement

### 3. 功和機械能 Work and Mechanical Energy

#### 3.1 功和功率

Work and power

#### 3.2 機械能，包括動能，地球表面附近的重力勢能，均勻球體的萬有引力勢能，疊加原理，彈性勢能，等等

Mechanical energy, including but not limited to, kinetic energy, gravitational potential energy near Earth surface, gravitational potential energy of solid spheres, superposition principle and elastic energy

#### 3.3 功能原理和機械能守恆定律

Work-energy theorem and law of conservation of mechanical energy

### 4. 動量和衝量 Momentum and Impulse

#### 4.1 動量和衝量

Momentum and impulse

#### 4.2 動量定理和動量守恆定律

Theorem of momentum and law of conservation of momentum

#### 4.3 彈性碰撞、非彈性碰撞和完全非彈性碰撞

Elastic collision, inelastic collision and the completely inelastic collision

#### 4.4 質心 Center of mass