

## IGCSE Physics Worksheet

### Topic: Forces and Their Effects / 力及其作用

#### Reading Passage / 閱讀文章

A force is a push or pull that can change the motion or shape of an object. Forces are vector quantities with magnitude and direction. Multiple forces combine to determine motion.

Effects of forces include: changing speed, changing direction, changing shape, and causing rotation (moment). Balanced forces do not change motion; unbalanced forces cause acceleration. Friction and air resistance oppose motion. Understanding forces is essential for analysing motion.

力是推或拉的作用，可改變物體的運動或形狀。力是向量量，具有大小和方向。多個力的合力決定物體的運動。

力的作用包括：改變速度、改變方向、改變形狀、產生轉動（力矩）。平衡力不會改變運動；不平衡力會使物體加速。摩擦力和空氣阻力會阻礙運動。理解力的作用對分析運動非常重要。

#### Questions / 問題

##### Section A:

1. Define a force. / 定義力。
2. State two effects of a force. / 說出力的兩種作用。
3. What are balanced forces? / 什麼是平衡力？
4. Why is friction an opposing force? / 為何摩擦力是阻力？
5. Why is force a vector? / 為何力是向量？

##### Section B:

6. A box is pushed with 15 N right and friction is 7 N left. (a) Resultant force? (b) Effect on motion? / 箱子受 15 N 向右與 7 N 向左摩擦力。 (a) 合力？(b) 運動變化？
7. A student pulls a spring with 5 N. (a) Effect? (b) If pulling harder? / 學生以 5 N 拉彈簧。 (a) 變化？(b) 若施力更大？

8. A door is opened with 12 N at 0.8 m. (a) Name of turning effect? (b) Moment? / 門在 0.8 m 處施 12 N。 (a) 轉動名稱？(b) 力矩？

**Section C:**

9. Explain why a cyclist slows downhill without brakes. / 解釋單車下坡不用煞車也會減速。

**Answer Key / 答案**

**Section A:**

1. A force is a push or pull. / 力是推或拉。
2. Change speed, direction, shape, rotation. / 改變速度、方向、形狀、產生轉動。
3. Balanced forces cause no change in motion. / 平衡力不改變運動。
4. Friction acts opposite motion. / 摩擦力方向與運動相反。
5. Force has magnitude and direction. / 力有大小和方向。

**Section B:**

6(a)  $15 - 7 = 8$  N right. / 8 N 向右。

6(b) Accelerates right. / 向右加速。

7(a) Spring stretches. / 彈簧伸長。

7(b) More force  $\rightarrow$  more extension. / 力越大  $\rightarrow$  伸長越大。

8(a) Moment. / 力矩。

8(b)  $12 \times 0.8 = 9.6$  N·m. / 9.6 N·m.

**Section C:**

9. Friction and air resistance oppose motion, causing deceleration. / 摩擦力與空氣阻力阻礙運動，使其減速。