

4. (a) 當球體積 > 剩餘空間 = $500 \times 10 = 5000 \text{ cm}^3$

$$100x > 5000 \Rightarrow x > 50 \therefore \text{第51顆} \quad *$$

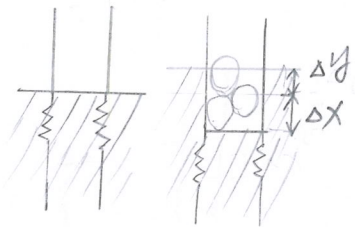
(b) 重力: $0.45 \text{ kg} \times 10 \text{ m/s}^2 = 4.5 \text{ N} \downarrow$ *

浮力: $0.1 \text{ kg} \times 10 \text{ m/s}^2 = 1 \text{ N} \uparrow$ *

正向力: $4.5 - 1 = 3.5 \text{ N} \uparrow$ *



(c) 彈簧力 = $100 \times \Delta x$, Δx 為彈簧壓縮量



Δy : 水位上升

$$200 \Delta x = (500 - 200) \Delta y$$

$$\Rightarrow \Delta y = \frac{2}{3} \Delta x$$

$$\text{浮力} = 200 (\Delta x + \Delta y) \times 1 = 200 \times \frac{5}{3} \Delta x$$

$$\text{水溢出} \Rightarrow \Delta y \geq 10 \Rightarrow \Delta x \geq 15$$

重 = 彈 + 浮

$$450 \text{ N} = 100 \times 15 + 200 \times \frac{5}{3} \times 15 = 6500$$

$$n = 14.44 \text{ 取整數, } \therefore \text{第15顆} \quad *$$

(d) $450 = 100 \Delta x + 200 \times \frac{5}{3} \Delta x$

$$= 150 \Delta y + 500 \Delta y \quad (\text{每顆球造成的水位變化})$$

$$\Delta y = 0.69$$

$$\text{溢出 } 0.69 \times 300 = 207 \text{ cm}^3 \quad *$$