

# 北一女中 104 學年度《數戰數決》有獎徵答活動

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題號：1-3 頁碼/總頁數：\_\_\_\_\_ (如果只有一頁，可不填)

(請不要將兩題的解答寫在同一張答案紙，一題的解答也不要寫在同一張答案紙的正反面。)

已知  $f(x) = ax + b$ ,  $a, b$  均為整數

$$f(f(0)) = 0, f(f(f(20))) = 15$$

$$f(0) = b$$

$$\begin{aligned} f(f(0)) &= f(b) \\ &= ab + b \\ &= (a+1)b \\ &= 0 \end{aligned}$$

$$\rightarrow a = -1 \text{ or } b = 0$$

$$f(20) = 20a + b$$

$$f(f(20)) = 20a^2 + ab + b$$

$$\begin{aligned} f(f(f(20))) &= 20a^3 + a^2b + ab + b \\ &= 15 \end{aligned}$$

① 若  $a = -1$ ,  $-20 + b - b + b = 15$   
 $-20 + b = 15$

$$\text{得 } \begin{cases} a = -1 \\ b = 35 \end{cases}$$

② 若  $b = 0$ ,  $20a^3 = 15$

$$a = \sqrt[3]{\frac{3}{4}} \text{ (不合)}$$

可得  $f(x) = -x + b$

$$\begin{aligned} f(f(x)) &= -(x+b) + b \\ &= -x \end{aligned}$$

$$\begin{aligned} f(f(f(x))) &= f(x) \\ &= -x + b \end{aligned}$$

$$\begin{aligned} f(f(f(f(x)))) &= f(f(x)) \\ &= -x \end{aligned}$$

$$f(f(f(f(1)))) + f(f(f(f(2)))) + \dots + f(f(f(f(2015))))$$

$$= 1 + 2 + \dots + 2015$$

$$= \frac{(2015+1) \times 2015}{2}$$

$$= 2031120 \#$$