

37. Consider the observations  $a, b$  and  $c$  such that  $b = a + c$ . If the standard deviation of  $a+2, b+2, c+2$  is  $d$  then which of the following is true?

①  $b^2 = 3(a^2 + c^2) + 9d^2$     ②  $b^2 = a^2 + c^2 + 3d^2$

③  $b^2 = 3(a^2 + c^2 + d^2)$     ④  $b^2 = 3(a^2 + c^2) - 9d^2$

$\Rightarrow$  For  $a, b, c$ , mean  $= \frac{a+b+c}{3} = \bar{x}$

$$b = a + c$$

$$\Rightarrow \bar{x} = \frac{2b}{3}$$

$$\text{S.D.}(a+2, b+2, c+2)$$

$$= \text{S.D.}(a, b, c) = d$$

$$\Rightarrow d^2 = \frac{a^2 + b^2 + c^2}{3} - (\bar{x})^2$$

$$= \frac{a^2 + b^2 + c^2}{3} - \frac{4b^2}{9}$$

$$\Rightarrow 9d^2 = 3(a^2 + b^2 + c^2) - 4b^2$$

$$\Rightarrow b^2 = 3(a^2 + c^2) - 9d^2$$