Question #214
Answer: A

Let π be the benefit premium at issue.

$$\pi = 10{,}000\frac{A_{45:\overline{20}|}}{\ddot{a}_{45:\overline{20}|}} = 10{,}000\frac{\left[0.20120 - 0.25634\left(0.43980\right) + 0.25634\right]}{14.1121 - 0.25634\left(9.8969\right)}$$
$$= 297.88$$

The expected prospective loss at age 60 is

$$10{,}000\,{}_{15}V_{45:\overline{20}|} = 10{,}000A_{60:\overline{5}|} - 297.88\,\ddot{a}_{60:\overline{5}|}$$
$$= 10{,}000 \times 0.7543 - 297.88 \times 4.3407$$
$$= 6250$$

where $A^1_{60:\overline{5}|} = 0.36913 - 0.68756\left(0.4398\right) = 0.06674$

$A_{60:\overset{1}{\overline{5}|}} = 0.68756$

$A_{60:\overline{5}|} = 0.06674 + 0.68756 = 0.7543$

$\ddot{a}_{60:\overline{5}|} = 11.1454 - 0.68756 \times 9.8969 = 4.3407$

After the change, expected prospective loss = $10{,}000A^1_{60:\overline{5}|} + (\text{Reduced Amount})\,A_{60:\overset{1}{\overline{5}|}}$

Since the expected prospective loss is the same

$$6250 = \left(10{,}000\right)\left(0.06674\right) + \left(\text{Reduced Amount}\right)\left(0.68756\right)$$

Reduced Amount = 8119