

9. Solution: D

For the first 10 years, each payment equals 150% of interest due. The lender charges 10%, therefore 5% of the principal outstanding will be used to reduce the principal.

At the end of 10 years, the amount outstanding is $1000(1 - 0.05)^{10} = 598.74$

Thus, the equation of value for the last 10 years using a comparison date of the end of year 10 is

$$598.74 = X a_{\overline{10}|10\%}. \text{ So } X = \frac{598.74}{a_{\overline{10}|10\%}} = 97.4417$$

Alternatively, derive answer from basic principles rather than intuition.

Equation of value at time 0:

$$1000 = 1.5(.1)(1000) (v + .95 v^2 + .95^2 v^3 + \dots + .95^9 v^{10}) + X v^{10} a_{\overline{10}|.1}$$

$$\text{Thus } X = [1000 - \{1.5(.1)(1000) (v + .95 v^2 + .95^2 v^3 + \dots + .95^9 v^{10})\}] / (v^{10} a_{\overline{10}|.1})$$

$$= \{1000 - [150 v (1 - (.95 v)^{10}) / (1 - .95 v)]\} / (v^{10} a_{\overline{10}|.1}) = 97.44$$