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The student response includes both of these criteria.

- Any two of the three possible equations
- Values of a and b

Model Solution

(i) Because $M(0) = 500$, $M(6) = 508.67$ and $M(12) = 517.50$, equations to find a and b are

$$ab^{(0/12)} = 500$$

$$ab^{(6/12)} = 508.67$$

$$ab^{(12/12)} = 517.50.$$

(ii) Because $M(0) = 500$, $ab^0 = 500 \Rightarrow a = 500$

$$500 \cdot b^{1/2} = 508.67$$

$$b = \left(\frac{508.67}{500}\right)^2 = 1.034981$$

For $t \geq 0$,

$$M(t) = 500 \cdot (1.035)^{(t/12)} \text{ OR } M(t) = 500 \cdot (1.034)^{(t/12)}$$

Part B

Select a point value to view scoring criteria, solutions, and/or examples to score the response.



0	1	2	3
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The student response includes all three of these criteria.

- Correct average rate of change based on exponential $M(t)$ from Part A
- Correct estimate for $t = 20$ based on average rate of change found in (i)
- Correct answer with explanation

Model Solution

$$(i) \frac{M(12) - M(-2)}{12 - (-2)} = \frac{(517.50 - 500)}{14} = 1.25$$

The average rate of change is 1.25 dollars per month.

$$(ii) \text{ The average rate of change is } r = \frac{M(12) - M(-2)}{12 - (-2)} = 1.25.$$