

f r q

$$a = \frac{59}{b^2} \Rightarrow \left(\frac{59}{b^2}\right)b^8 = 118$$

$$b = \left(\frac{118}{59}\right)^{1/6} = 1.122462$$

$$a = 46.828331$$

$$P(t) = 46.828(1.122)^t$$

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 $P(t)$ from Part A
- Correct estimate for $t = 10$ based on average rate of change found in (i)
- Correct answer with explanation

Model Solution

$$(i) \frac{P(8)-P(2)}{8-2} = \frac{(118-59)}{6} = 9.833327$$

The average rate of change is **9.833** plants per year.

$$(ii) \text{ The average rate of change is } r = \frac{P(8)-P(2)}{8-2} = 9.833327.$$

The secant line through point $(2, P(2))$ and point $(8, P(8))$ is given by $y = y_1 + \left(\frac{P(8)-P(2)}{8-2}\right)(x - x_1)$, where (x_1, y_1) can be either one of the points.

Estimates using the average rate of change are given by

$$y = P(2) + r(x - 2)$$

OR

$$y = P(8) + r(x - 8).$$

Both of these produce the same estimate.

For $x = 10$,

$$y = 59 + r(10 - 2) = 137.667.$$

The number of plants for $t = 10$ years was approximately **137** or **138**.