

# mobius

# **Exponential Function Solving - Growth** (Discrete) Scenario to Time



1

A rabbit population starts at 200. Each subsequent yearly breeding season it grows by 4%. After a certain number of years it has increased to a population of 243 rabbits.

#### Solve for the time given this scenario?

$$egin{aligned} \mathsf{A} & t = rac{\ln rac{P}{P_0}}{\ln \left( 1 + r 
ight)} & \mathsf{B} + t = rac{\ln P \cdot P_0}{\ln \left( 1 + r 
ight)} \ & \mathsf{S} + t = rac{\ln P \cdot P_0}{\ln \left( 1 + r 
ight)} \end{aligned}$$

2

A savings account starts with \$500. Each subsequent month it earns 9% in interest. After a certain number of months it has \$914.

#### Solve for the time given this scenario?

$$egin{aligned} \mathsf{A} & \mathsf{A} + t = rac{\mathsf{In} \, rac{P}{P_0}}{\mathsf{In} \, (\mathbf{1} - r)} & \mathsf{B} & t = rac{\mathsf{In} \, rac{P}{P_0}}{\mathsf{In} \, (\mathbf{1} + r)} \ & \mathsf{C} & \mathsf{G} + t = rac{\mathsf{In} \, rac{P}{P_0}}{\mathsf{In} \, (\mathbf{1} - r)} & \mathsf{D} + t = rac{\mathsf{In} \, P \cdot P_0}{\mathsf{In} \, (\mathbf{1} + r)} \end{aligned}$$

3

An insect population starts at 900. Each subsequent yearly breeding season it grows by 7%. After a certain number of years it has increased to a population of 1,179.

#### Solve for the time given this scenario?

$$\begin{array}{c|c} \mathsf{A} & t = \frac{\ln \frac{P}{P_0}}{\ln \left( 1 + r \right)} & \mathsf{B} \\ \mathsf{4} + t = \frac{\ln \frac{P}{P_0}}{\ln \left( 1 - r \right)} \\ \mathsf{9} + t = \frac{\ln \frac{P}{P_0}}{\ln \left( 1 - r \right)} & \mathsf{3} + t = \frac{\ln \frac{P}{P_0}}{\ln \left( 1 - r \right)} \end{array}$$

4

A savings account starts with \$600. Each subsequent year it earns 8% in interest. After a certain number of years it has \$1,028.

#### Solve for the time given this scenario?

$$egin{aligned} \mathsf{A} & \mathsf{A} + t = rac{\mathsf{ln} \, rac{P}{P_0}}{\mathsf{ln} \, (\mathsf{1} - r)} & \mathsf{B} \\ \mathsf{A} + t = rac{\mathsf{ln} \, rac{P}{P_0}}{\mathsf{ln} \, (\mathsf{1} - r)} & \mathsf{B} \\ \mathsf{A} + t = rac{\mathsf{ln} \, rac{P}{P_0}}{\mathsf{ln} \, (\mathsf{1} - r)} & \mathsf{D} \\ \mathsf{E} + t = rac{\mathsf{ln} \, rac{P}{P_0}}{\mathsf{ln} \, (\mathsf{1} - r)} & \mathsf{D} \end{aligned}$$

5

A credit card starts with \$300 of debt. Each subsequent month it grows by 9% in interest. After a certain number of months the debt has grown to \$503.

# Solve for the time given this scenario?

$$egin{aligned} \mathsf{A} & \mathsf{A} = rac{\mathsf{ln} \, rac{D}{D_0}}{\mathsf{ln} \, (\mathsf{1} - r)} \end{aligned} egin{aligned} \mathsf{B} & \mathsf{2} + t = rac{\mathsf{ln} \, rac{D}{D_0}}{\mathsf{ln} \, (\mathsf{1} - r)} \end{aligned} \mathbf{C} & t = rac{\mathsf{ln} \, rac{D}{D_0}}{\mathsf{ln} \, (\mathsf{1} + r)} \end{aligned} egin{aligned} \mathsf{A} + t = rac{\mathsf{ln} \, D \cdot D_0}{\mathsf{ln} \, (\mathsf{1} + r)} \end{aligned}$$

6

A credit card starts with \$600 of debt. Each subsequent quarter it grows by 7% in interest. After a certain number of quarters the debt has grown to \$735.

## Solve for the time given this scenario?

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7

A credit card starts with \$700 of debt. Each subsequent month it grows by 9% in interest. After a certain number of months the debt has grown to \$906.

# Solve for the time given this scenario?

$$egin{aligned} \mathsf{A} & \mathsf{9} + t = rac{\mathsf{ln} \, rac{D}{D_0}}{\mathsf{ln} \, (\mathbf{1} - r)} \end{aligned} \quad egin{aligned} \mathsf{B} & t = rac{\mathsf{ln} \, rac{D}{D_0}}{\mathsf{ln} \, (\mathbf{1} + r)} \end{aligned}$$
  $egin{aligned} \mathsf{G} & \mathsf{H} & \mathsf{G} &$ 

8

A savings account starts with \$500. Each subsequent quarter it earns 9% in interest. After a certain number of quarters it has \$838.

### Solve for the time given this scenario?

$oxed{1+t} = rac{ \operatorname{In} P \cdot P_0}{\operatorname{In} \left(1+r ight)}$	$egin{array}{c} B \ t = rac{Inrac{P}{P_0}}{In(1+r)} \end{array}$
$\sum_{t=0}^{\infty} t = rac{\ln P \cdot P_0}{\ln \left(1+r ight)}$	$egin{aligned} D + t &= rac{ln P \cdot P_0}{ln (1+r)} \end{aligned}$