



d.  $12^{3x-9} = 1$

e.  $5^{x^2} = 125(5^{2x})$

### Example 3: Solve Problems Involving Exponential Equations

A painting quadruples in value every 15 years. It is currently worth \$1000.

- Write an exponential function that models the value,  $V$ , of the painting after  $t$  years.
- Use your equation to determine the value of the painting in 12 years.
- Use your equation to determine the time needed for the painting to be worth \$32 000.

#### Solution:

- The exponential function can be written in the form  $y = ac^{bx}$ : \_\_\_\_\_
- Substitute  $t = 12$  into your equation and solve for  $V$ :
- Substitute  $V = 32\,000$  into your equation and solve for  $t$ :

### Example 4: Solve Problems Involving Exponential Equations

The half-life of a radioactive substance is 4 days.

- Write an exponential function that models the amount,  $A$ , of the substance remaining after  $t$  days.
- Use your equation to determine the time that must pass until there is 12.5% of the substance remaining.

#### Solution:

- The exponential function can be written in the form  $y = ac^{bx}$ : \_\_\_\_\_
- Substitute  $A =$  \_\_\_\_\_ into your equation and solve for  $t$ :