



Algebra1Coach.com

Exponential Growth and Decay

Unit 7 Lesson 7

EXPONENTIAL GROWTH AND DECAY

Students will be able to:

Solve problems involving exponential growth and decay using properties of exponent.

Key Vocabulary:

- Exponent
- Growth
- Decay
- Rate
- Time

EXPONENTIAL GROWTH AND DECAY

Sample Problem 1: Solve problems involving exponential growth and decay.

1. A certain cell splits into 2 after every hour. How many cells will be there after four hours if there are 17 cells at the start?

EXPONENTIAL GROWTH AND DECAY

Sample Problem 1: Solve problems involving exponential growth and decay.

1. A certain cell splits into 2 after every hour. How many cells will be there after four hours if there are 17 cells at the start?

Solution:

Time	Calculation	Number of cell N
0	-	17
1	$17(2)$	34
2	$34(2)$	68
3	$68(2)$	136
4	$136(2)$	272

EXPONENTIAL GROWTH AND DECAY

Sample Problem 1: Solve problems involving exponential growth and decay.

1. A certain cell splits into 2 after every hour. How many cells will be there after four hours if there are 17 cells at the start?

Solution:

Time	Equation	Number of cell N
0	$17(2)^0$	17
1	$17(2)^1$	34
2	$17(2)^2$	68
3	$17(2)^3$	136
4	$17(2)^4$	272
t	$17(2)^t$	N_t

EXPONENTIAL GROWTH AND DECAY

Sample Problem 1: Solve problems involving exponential growth and decay.

1. A certain cell splits into 2 after every hour. How many cells will be there after four hours if there are 17 cells at the start?

Solution:

From the solution above, the number of cell **N**, after **t** hours can be expressed using the equation $N_t = N_0(2)^t$

$$N_0 = 17; t = 4$$

$$N_4 = 17(2)^4 = 272$$

EXPONENTIAL GROWTH AND DECAY

Sample Problem 1: Solve problems involving exponential growth and decay.

2. Suppose that a TV set depreciate 10% in value each year for the first five years. What is it worth after five years if its original cost was \$1300?

EXPONENTIAL GROWTH AND DECAY

Sample Problem 1: Solve problems involving exponential growth and decay.

2. Suppose that a TV set depreciate 10% in value each year for the first five years. What is it worth after five years if its original cost was \$1300?

Solution:

Time	Calculation	Amount
0	-	1300
1	$1300 - (1300 \times 0.1)$	1170
2	$1170 - (1170 \times 0.1)$	1053
3	$1053 - (1053 \times 0.1)$	947.7
4	$947.7 - (947.7 \times 0.1)$	852.93
5	$852.93 - (852.93 \times 0.1)$	767.64

EXPONENTIAL GROWTH AND DECAY

Sample Problem 1: Solve problems involving exponential growth and decay.

2. Suppose that a TV set depreciate 10% in value each year for the first five years. What is it worth after five years if its original cost was \$1300?

Solution:

Time	Equation	Amount
0	$1300(1 - 0.1)^0$	1300
1	$1300(1 - 0.1)^1$	1170
2	$1300(1 - 0.1)^2$	1053
3	$1300(1 - 0.1)^3$	947.7
4	$1300(1 - 0.1)^4$	852.93
5	$1300(1 - 0.1)^5$	767.64
t	$1300(1 - 0.1)^t$	N_t

EXPONENTIAL GROWTH AND DECAY

Sample Problem 1: Solve problems involving exponential growth and decay.

2. Suppose that a TV set depreciate 10% in value each year for the first five years. What is it worth after five years if its original cost was \$1300?

Solution:

$N_t = N_0(1 - r)^t$, Where N_0 the original amount r is the rate and t is the number of years.

$N_0=1300$; $r = 10\%$ or 0.1 ; $t = 5$

$$N_5 = 1300(1 - 0.1)^5 = 767.64$$

EXPONENTIAL GROWTH AND DECAY

Sample Problem 1: Solve problems involving exponential growth and decay.

3. Lisa deposited \$1000 in a saving account which pays 12% interest compounded annually. How much interest will her money earns in 5 years.

EXPONENTIAL GROWTH AND DECAY

Sample Problem 1: Solve problems involving exponential growth and decay.

3. Lisa deposited \$1000 in a saving account which pays 12% interest compounded annually. How much interest will her money earn in 5 years.

Solution:

Time	Calculation	Amount
0	-	1000
1	$1000 + (1000 \times 0.12)$	1120
2	$1120 + (1120 \times 0.12)$	1254.4
3	$1254.4 + (1254.4 \times 0.12)$	1404.9
4	$1404.9 + (1404.9 \times 0.12)$	1573.52
5	$1573.52 + (1573.52 \times 0.12)$	1762.34

EXPONENTIAL GROWTH AND DECAY

Sample Problem 1: Solve problems involving exponential growth and decay.

3. Lisa deposited \$1000 in a saving account which pays 12% interest compounded annually. How much interest will her money earns in 5 years.

Solution:

Time	Equation	Amount
0	$1000(1 + 0.12)^0$	1000
1	$1000(1 + 0.12)^1$	1120
2	$1000(1 + 0.12)^2$	1254.4
3	$1000(1 + 0.12)^3$	1404.9
4	$1000(1 + 0.12)^4$	1573.52
5	$1000(1 + 0.12)^5$	1762.34
t	$1000(1 + 0.12)^t$	N_t

EXPONENTIAL GROWTH AND DECAY

Sample Problem 1: Solve problems involving exponential growth and decay.

3. Lisa deposited \$1000 in a saving account which pays 12% interest compounded annually. How much interest will her money earns in 5 years.

Solution:

$N_t = N_0(1 + r)^t$ where **N₀** is the original amount, **r** is the rate and **t** is the number of years.

$N_0 = \$1000$; $r = 12\%$ or 0.12 ; $t = 5$

$$N_5 = 1000(1 + 0.12)^5 = 1762.34$$

EXPONENTIAL GROWTH AND DECAY

Note:

Terms	Rate	Time
Annually	r	t
Semi - Annually	$r/2$	$2t$
Quarterly	$r/4$	$4t$
Monthly	$r/12$	$12t$