

Quarter 3 Test Review

Unit 9

I. For a sequence, write arithmetic and the common difference or geometric and the common ratio. If a sequence is neither arithmetic nor geometric, write neither.

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|--|-------|----------------------|
| 1) 2, 5, 8, 11, 14, ... | _____ | common _____ = _____ |
| 2) 18, 6, 2, 2/3, ... | _____ | common _____ = _____ |
| 3) 4, -8, 16, -32, ... | _____ | common _____ = _____ |
| 4) $\frac{1}{27}, \frac{1}{9}, \frac{1}{3}, 1, 3, \dots$ | _____ | common _____ = _____ |
| 5) -5, -3, -1, 1, 3, ... | _____ | common _____ = _____ |

II. Given the first term and either common difference or common ratio, write the first 4 terms of the sequence.

- 1) First term = 3 , common ratio = 5 _____
- 2) $a_1 = 4 , d = 4$ _____
- 3) $a_1 = 5 , r = -1/3$ _____
- 4) first term = 6, common difference = -2 _____

III. Solve each of the following

1. An exponentially decaying radioactive ore originally weighs 30 grams and is reduced to 15 grams in 100 years. How much will be left in 400 years? Write an exponential decay function in order to find the solution

Function: _____ Amount remaining: _____

2. Hg-197 is used in kidney scans and it has a half-life of 2 days. Write the exponential decay function for a 700-mg sample. Find the amount remaining after 12 days.

Function: _____ Amount remaining: _____

3. A ball is dropped from a height of 405 feet into a parking lot and keeps bouncing up and down. Each bounce is $3/5$ of the drop height.

Explicit Equation: _____ Height after 4th bounce: _____

Quarter 3 Test Review

Unit 10

1. Gilberto a new smart car at a cost of \$18,000. The car's value decreases exponentially at the same rate each year and one year later the cars value was \$16,560.

- What is the common ratio? _____
- By what percentage is the car's value depreciating each year? _____
- Write an equation to model the decay value of this car, where y is the value of the car; x is the number of years since new purchase. _____

2. The population of Zootopia is 3,000 animals. It is growing at a rate of 4% per year.

- Write an explicit equation to represent this situation: _____
- What is the common ratio? _____
- How many animals will live in Zootopia five years later? _____
- How many years will it take for Zootopia to have over 4,000 animals? _____

3. You have an initial investment of \$10,000 to be invested at a 4.2% interest rate compounded semi-annually.

- Write the compound interest formula (with variables, no numbers yet): _____
- How much will the investment be worth in 5 years? _____
- How many years will it take for the investment to be worth \$18,000? _____

4. You deposit \$8,250 into a bank account with 2.5% interest rate compounded quarterly. How much money will be in your account at the end of 15 years?

5. The population of a town grows exponentially each year. The population 1 year ago was 8,000. Today the population is 9,280.

- What is the common ratio? _____
- By what percentage is the population growing each year? _____
- What will the population be in 4 years? _____
- How many years will it take the population to reach 30,000? _____

6. Change the following recursive formulas to their explicit equation.

- $a_n = a_{n-1} * 4$ $a_0 = 8$ _____ Linear or Exponential? _____
- $a_n = a_{n-1} + 6$ $a_0 = 2$ _____ Linear or Exponential? _____

Quarter 3 Test Review

7. Change the following explicit equations to their recursive formula. Don't forget to include the initial amount!

1. $y = 4x - 1$ _____ Linear or Exponential? _____

2. $y = 4(7)^x$ _____ Linear or Exponential? _____

8. Write the explicit equations for the tables below.

x	0	1	2	3
y	-2	0	2	4

x	0	1	2	3
y	-2	-10	-50	-250

Equation: _____

Equation: _____

Linear or Exponential?

Linear or Exponential?

Unit 11

1. **Projectile Motion** Alexis and Dante are hiking in the mountains. Alexis wants to climb to a ledge that is 20ft above her. The height the grappling hook can be thrown is given by the function $h = -16t^2 + 32t + 5$.

- What is the maximum height the grappling hook can reach?
- Can she throw it high enough to reach the ledge?
- When will the hook be 15 feet from the ground?
- When will the hook hit the ground?

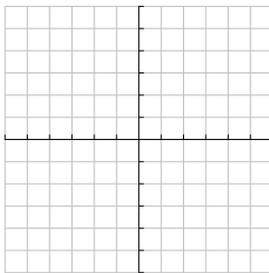
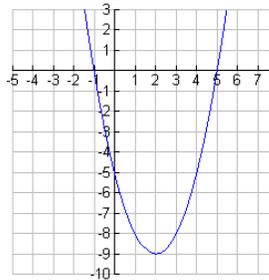
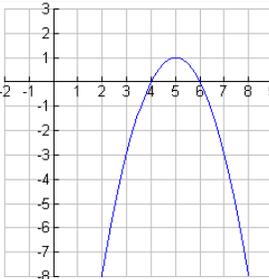
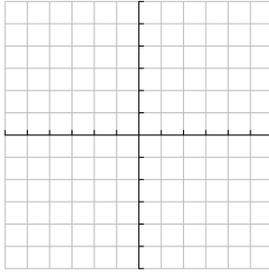
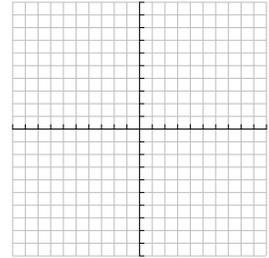
2. **More with Projectile Motion** A volcanic eruption blasts a boulder upward with an initial velocity of 240 feet per second. This is modeled by the equation $h(t) = -16t^2 + 240t$.

- How long will it take the boulder to hit the ground?
- How high was the boulder after 5 seconds?
- When was the boulder 500 feet in the air?

3. A girl is **swinging** on a swing in her back yard. Her path can be modeled by the quadratic function: $y = 3t^2 - 3t + 6$.

- How high off of the ground is the girl at 1 second?
- What was the girls initial height off of the ground?
- At what time will the girl be back up to her initial height?

Quarter 3 Test Review

	Intercepts	Vertex	Axis of symmetry	Sketch of Graph	Interval of Increasing Interval of Decreasing	Domain Range
Standard Form: $y = x^2 + 4x$ Solutions:	x-int: y-int:				Increasing: Decreasing:	Domain: Range:
Solutions: Max/Min?:	x-int: y-int:				Increasing: Decreasing:	Domain: Range:
Solutions: Max/Min?:	x-int: y-int:				Increasing: Decreasing:	Domain: Range:
Solutions: Max/Min?: (-3, -4) MIN	x-int: (-1,0) (-5,0) y-int: (0, 5)				Increasing: Decreasing:	Domain: Range:
Standard Form: $y = -x^2 - 8x - 7$ Max/Min?:	x-int: y-int:				Increasing: Decreasing:	Domain: Range: