

Name: _____ Date: _____ Period: _____

Mathematical Patterns

Show all work!!

Tier 1 (up to 60 points) Complete #1-3

Tier 2 (up to 80 points) Complete #1-4 Do not move up to Tier 2 if you have not completed all of Tier 1.

Tier 3 (up to 100 points) Complete #1-5 Do not move up to Tier 3 if you have not completed all of Tier 1 & Tier 2.

1. (20 points) Create your own arithmetic sequence, different from your classmates. It should have at least 5 terms.
 - a. Explain why your sequence is arithmetic.
 - b. Determine the common difference for your sequence.
 - c. Determine the explicit formula for your sequence.
 - d. Use your formula from part c to determine the 20th term for your sequence.

2. (20 points) After training for and running a marathon, an athlete wants to reduce her daily run by half each day. The marathon is about 26 miles. How many days will it take after the marathon for her to get down to running less than a mile a day?
 - a. Does this situation represent an arithmetic sequence, geometric sequence or neither? Explain.
 - b. Create an explicit formula M_n for this situation.
 - c. Determine the number of days it will take to get down to running less than a mile a day.

3. (20 points) During the first week of training you exercise for a total of 10 minutes. You increase the amount of time you spend exercising by twenty percent each week.
- Does this situation represent an arithmetic sequence, geometric sequence or neither? Explain.
 - Create an explicit formula for this situation.
 - Determine how many minutes will you train during your 12th week of training?
4. (20 points) A student says that a geometric sequence 6, _____, _____, 162 can be completed with 18 and 64.
- Is the student correct? Explain.
 - If the student is not correct, find the correct second and third terms.
5. (20 points) A student sets up a savings plan to transfer money from his checking account to his savings account. The first week \$10 is transferred, the second week \$12 is transferred, the third week \$16 is transferred, and the fourth week \$24 is transferred. If this pattern continues and he starts with \$100 in his checking account, how many weeks will pass before his balance is below zero?
- Does this situation represent an arithmetic sequence, geometric sequence or neither? Explain.
 - Determine how many weeks will pass before his balance is below zero.

Bonus: (10 points) What would be a recursive formula for the sequence described in #5?