

Unit 7: Sequences and Series

Day 8: Review

For the test, you will need to know:

- difference between sequences and series
- difference between t_n and S_n
- difference between arithmetic and geometric sequences
- how to use a recursion formula to determine term values and find the explicit formula if the resulting sequence is arithmetic or geometric

- how to identify key values such as a , n , d or r

- how to create the general term formula for any sequence:

arithmetic $t_n = a + (n-1)d$

geometric sequence $t_n = ar^{n-1}$

other (using patterns and relating to the term number)

- how to use the general term formula to determine a specific term value (t_n) or term number (n)

- how to calculate a and d/r given two different terms values

- how to calculate the sum of any given series

(arithmetic; $S_n = \frac{n}{2}[2a + (n-1)d]$) or $S_n = \frac{n}{2}[a + t_n]$

geometric; $S_n = \frac{a(r^n - 1)}{r - 1}$

- how to identify what type of word problem it is (i.e. arithmetic vs. geometric, term value vs. sum)

MCR 3UI - U7 - D8 - Review - complete

A friend began to save money for a vacation to France. She started by depositing \$12 in the first week, \$18 in the second week, \$24 in the third week and so on.

a) If the trip costs \$2100, how many weeks would this pattern have to continue for her to have enough money to go? (Assume she is not earning interest on the money she saves up).

Arithmetic

$$d = 6$$

$$a = 12$$

$$S_n = 2100$$

$$n = ?$$

$$S_n = \frac{n}{2} [2a + (n-1)d]$$

$$2100 = \frac{n}{2} [2(12) + (n-1)(6)]$$

$$2100 = \frac{n}{2} [24 + 6n - 6]$$

$$2 \times 2100 = \frac{n}{2} [18 + 6n] \times 2$$

$$4200 = n [18 + 6n]$$

$$4200 = 18n + 6n^2$$

$$0 = 6n^2 + 18n - 4200$$

$$0 = 6(n^2 + 3n - 700)$$

$$0 = 6(n-25)(n+28)$$

$$n-25=0 \quad \text{or} \quad n+28=0$$

$$n=25$$

$$n=-28$$

inadmissible

\therefore it would take her 25 weeks to get \$2100.

b) If she makes \$200 per week at her job, is it realistic to think that she can continue to invest in this pattern? Explain. (i.e. will she have enough money to invest each week? Assume she spends whatever she doesn't save for each week.)

$$t_{25} = 12 + (25-1)(6)$$

$$t_{25} = 12 + 144$$

$$t_{25} = 156$$

\therefore she does have enough money until the end of the 25 weeks.

After being poured, the temperature of coffee decreases by 1.5% every two minutes. If the current temperature of the coffee is 97° F, what will be the temperature of the coffee after 20 minutes, to the nearest tenth of a degree?

Geometric

$$a = 97$$

$$r = 100\% - 1.5\%$$

$$= 98.5\%$$

$$= 0.985$$

$$t_n = ?$$

$$n = \frac{20 \text{ min}}{2 \text{ min}} + 1$$

decrease

accounts for the first term

$$= 10 + 1$$

$$= 11$$

$$t_n = ar^{n-1}$$

$$t_{11} = 97(0.985)^{11-1}$$

$$t_{11} \approx 83.4^\circ$$

∴ the coffee would be 83.4° after 20 min.

Today's Review Questions:

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(Pick N Choose)