

General Mathematics

GRADE 11 REVIEWER - 1ST SEMESTER - FINALS

PATTERNS

- A recognizable regularity, sequence, or arrangement in numbers, shapes, or events.
- **Classifications**
 - **Finite** - Has an end
 - **Infinite** - Has an ellipsis (...)
- **Fibonacci Sequence**
 - A sequence where the next term is the sum of the previous terms.
 - **Ex.**
 - 1, 1, 2, 3, 5, 8

ARITHMETIC SEQUENCE

- A sequence of numbers where the difference between any two consecutive terms is always constant.
- This constant value is known as the **common difference** (d).
- **Formula:** $A_n = A_1 + (n - 1)d$
 - **Whereas:**
 - A_n = nth term
 - A_1 = First term
 - d = Common difference
 - n = Position of the term in the sequence
- **Example:** Find the 10th term of 5, 9, 13, 17

Given: $A_1 = 5, d = 4, n = 10$ **Solution:** $A_7 = 5 + (10 - 1)4$

Required: $A_7 = ?$ $= 5 + 36$

Equation: $A_n = A_1 + (n - 1)d$ **Answer:** $= 41$

- **Example:** In the sequence 2, 6, 10, 14... Find the value of n if $A_n = 30$.

Given: $A_1 = 2, d = 4, A_n = 30$ **Solution:** $30 = 2 + (n - 1)4$

Required: $n = ?$ $30 = 2 + 4n - 4$
 $30 - 2 + 4 = 4n$
 $\frac{32=4n}{4}$

Equation: $A_n = A_1 + (n - 1)d$ **Answer:** $n = 8$

GEOMETRIC SEQUENCE

- A sequence of numbers where each term after the first is found by multiplying the previous term by a fixed, non-zero number called the **common ratio** (r).
- **Formula:** $A_n = A_1 r^{n-1}$
 - **Whereas:**
 - A_n = nth term
 - A_1 = First term
 - d = Common ratio
 - n = Position of the term in the sequence
- **Example:** Find the 5th term where $A_1 = 5, r = 3$

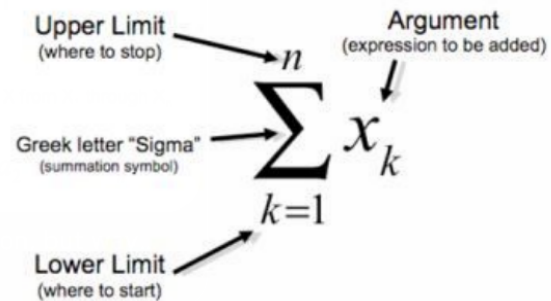
Given: $A_1 = 5, r = 3, n = 5$ **Solution:** $A_5 = 5(3)^{5-1}$

Required: $A_5 = ?$ $= 5(81)$

Equation: $A_n = A_1 r^{n-1}$ **Answer:** $= 405$

SERIES

- The sum of the terms of a sequence.
- **Finite vs. Infinite Series**
 - **Finite Series** - A series that has a specific, countable number of terms with a definitive beginning and end.
 - **Infinite Series** - A series that continues without end, meaning it has an infinite number of terms.
- **Partial Sum**
 - Used to determine the behavior of the series.
 - Sum of the first n terms (S_n)
- **Sigma Notation (Σ)**
 - Used to express series.



CONVERTING SIGMA NOTATION TO SERIES

- **Steps**
 - Copy notation, substitute values, add plus signs.
 - If the given is infinite, only convert 4 terms, following class agreement (may vary from different subject teachers).
- **Example:**

$$\sum_{k=1}^4 5k = 5(1) + 5(2) + 5(3) + 5(4) \\ = 5 + 10 + 15 + 20 \\ = 50$$

ARITHMETIC SERIES

- The sum of the terms in an arithmetic sequence.
- **Finite Sequence Formula:** $S_n = n \left(\frac{A_1 + A_n}{2} \right)$
- **Example:** Find the sum of an arithmetic sequence with 10 terms. 3, 10, 17, ..., 66

Given: $A_1 = 3, A_n = 66, n = 10$ **Solution:** $S_{10} = 10 \left(\frac{3+66}{2} \right)$

Required: $S_{10} = ?$ $= 10(34.5)$

Equation: $S_n = n \left(\frac{A_1 + A_n}{2} \right)$ **Answer:** $= 345$

- **InFinite Sequence Formula:** $S_n = \frac{n}{2} [(2A_1 + (n - 1)d)]$
- **Example:**

Given: $A_1 = 4, n = 15, d = 5$ **Solution:** $S_{15} = \frac{15}{2} [(2(4) + (15 - 1)5)]$

Required: $S_{12} = ?$ $= 7.5(8 + 70)$
 $= 7.5(78)$

Equation: **Answer:** $= 585$
 $S_n = \frac{n}{2} [(2A_1 + (n - 1)d)]$

GEOMETRIC SERIES

- The sum of the terms of a geometric sequence.

- **Finite Sequence Formula:** $S_n = \frac{A_1(1-r^n)}{1-r}$
- **Example:** Find the sum of 5 terms in the geometric sequence:
5 + 15 + 45 + 135...

Given: $A_1 = 5, r = 3, n = 5$

$$\text{Solution: } S_5 = \frac{5(1-3^5)}{1-3}$$

Required: $S_5 = ?$

$$= \frac{5(-242)}{-2} = \frac{-1210}{-2}$$

$$\text{Equation: } S_n = \frac{A_1(1-r^n)}{1-r}$$

Answer: = 605

- **InFinite Sequence Formula:** $S_n = \frac{A_1}{1-r}$
- **Example:**

Given: $A_1 = 8, r = \frac{1}{2}$

$$\text{Solution: } S_\infty = \frac{8}{1-\frac{1}{2}}$$

Required: $S_\infty = ?$

Answer: = 16

$$\text{Equation: } S_n = \frac{A_1}{1-r}$$

APPRECIATION AND DEPRECIATION

APPRECIATION

- The **increase** in the value of an asset over time.
- Commonly seen in real estate, land, collectibles, and certain investments.
- Calculated by using the **geometric sequence formula**.
 - $A_n = A_1 r^{n-1}$
- **Example:** An antique painting was purchased for PHP 45,000. It appreciates in value by 12% each year. Find its value after 5 years.

Given:
 $A_1 = 45,000$
 $r = 12\% + 100 = x1.12$
 $n = 5$

$$\text{Solution: } A_5 = 50,400(1.12)^{5-1}$$

Required: $A_5 = ?$

$$\text{Equation: } A_n = A_1 r^{n-1} \quad \text{Answer: } = 79,305.38$$

DEPRECIATION

- The **decrease or reduction** in the value of an asset over time, typically caused by wear and tear, usage, age, or obsolescence.
- Common examples include cars, gadgets, and machinery.
- Calculated by using the **geometric sequence formula**.
 - $A_n = A_1 r^{n-1}$
- **Example:** A laptop was bought for PHP 55,000 in 2020. It depreciates annually by 20%. Find its value in 2026.

Given:
 $A_1 = 55,000$
 $r = 100 - 20\% = x0.80$
 $n = 6$

$$\text{Solution: } A_6 = 44,000(0.80)^{6-1}$$

Required: $A_6 = ?$

$$\text{Equation: } A_n = A_1 r^{n-1} \quad \text{Answer: } = 14,417.92$$

SIMPLE AND COMPOUND INTEREST

SIMPLE INTEREST

- It is calculated on the principal amount and then added into the total balance.
- **Formula:** $SI = PRT$
 - $P = \text{Principal Amount}$
 - $R = \text{Rate}$
 - $T = \text{Time}$

COMPOUND INTEREST

- Its interest is computed on the principal amount and on the accumulated past interest.
- **Loan**
 - Refers to the money borrowed that must be paid over time.
 - It's usually with added interest.
- **Mortgage**
 - Specific type of loan **used to buy real estate properties**.
 - Property loaned is used as a guarantee or *collateral* until the loan is paid. Meaning, a **bank could take back the property** if money is not paid.
- **Accumulated Value**
 - Also known as **future value**.
 - Describes the total amount an investment is worth through time.
 - Includes its original investment and all growth processes.

NOTE/S: In accumulated value, starting year is always included (ex., 2021-2026 = 6 years).

- **Conversion period**

Type	Duration
Annual	1 year
Semi-Annual	6 months
Quarterly	4 months
Monthly	1 month
Frequency of Conversion	Numbers of conversion period in 1 year
Rate	Yearly rate of increase
Period Rate	Rate of interest in 1 conversion period
Time of Term	How long money is borrowed/invested in years

METRIC UNITS

- **Length**
 - One dimensional measure of distance between 2 points
 - Expressed in units of distance.
 - Millimeters (mm) - very small
 - Centimeters (cm) - small-medium
 - Meters (m) - large object/distance
 - Kilometers (km) - long distances
- **Mass**
 - Measures the amount of matter.
 - Milligrams (mg) - very light
 - Grams (g) - small items
 - Kilograms (kg) - heavier items
 - Tons/Tonnes (t) - heavy loads
- **Capacity/Volume**
 - 3-dimension measure of space occupied by a substance or object.

- **Time**
 - Measures the duration of an event.
 - In SI units, it is referred to as seconds.
 - Seconds (s)
 - Minutes (min)
 - Hours (h or hr)
 - Days (d)

CONVERSION RATIO

- Also known as **Unit Factor** whose ratio = 1.
- It carries the names of units to be used.

	ENGLISH	METRIC
LENGTH	12 in = 1 ft	1 cm = 10mm
	3 ft = 1 yd	1 m = 100 cm
	5280 ft = 1 mi	1 km = 1000 m
WIDTH	1 lb = 16 oz	1 g = 1000 mg
	1 t = 2000 lbs	1 kg = 1000 g
		1 mt = 1000 kg
VOLUME / CAPACITY	1 gal = 4 qt	1 L = 1000 mL
	1 qt = 2 p	1 m ³ = 1000 L
	1 p = 2 c	

- **Example:** Convert 10,000 lbs to tons.

$$1 t = 2000 lbs$$

$$\begin{aligned}
 &= 10,000 \text{ lbs} \cdot \frac{1 t}{2000 \text{ lbs}} \\
 &= \frac{10,000 t}{2000} \\
 &= 5 t
 \end{aligned}$$

UNIT CONVERSIONS

- Conversions in the English system.
- Conversion table only shows the widely accepted estimate amounts (≈).
- Calculated the same way as the conversion ratio.

LENGTH	1 in ≈ 2.54 cm
	1 ft ≈ 0.3048 m
	1 mi ≈ 1.609 km
WIDTH	1 oz ≈ 28.35 g
	1 lb ≈ 0.4536 kg
	1 kg ≈ 2.2046 lbs
VOLUME / CAPACITY	1 oz ≈ 29.57 mL
	1 gal ≈ 3.785 L
	1 L ≈ 0.2642 gal
	1 L ≈ 4.22675 c

SCIENTIFIC NOTATION

- It is a method to **express very large or very small numbers**.
- Represented as $m \times 10^n$.
 - Where:
 - m = coefficient / significand / mantissa

- Greater than 1, less than 10

- n = integer exponent

- **Example:**

7,600,000,000.

10 9 8 7 6 5 4 3 2 1



10 Units to the Left!

Moving to the Left = Positive Exponent

$$2.76 \times 10^{10}$$

0.000073

1 2 3 4 5



5 Units to the Right!

Moving to the Right = Negative Exponent

$$7.3 \times 10^{-5}$$

GOD BLESS!

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"Prayers mo lang sapat na"

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