SEQUENCES

A NUMERICAL SEQUENCE

A.1 FINDING u_n

Ex 1:

n	1	2	3	4	5	6
u_n	3	5	7	9	11	13

What is u_4?

☐

Ex 2:

n	1	2	3	4	5	6
u_n	2	6	12	20	30	42

What is u_5?

☐

Ex 3:

n	1	2	3	4	5	6	7	8
u_n	4	9	16	25	36	49	64	81

What is u_7?

☐

Ex 4:

n	1	2	3	4	5	6	7	8
u_n	1	3	7	15	31	63	127	255

What is u_8?

☐

A.2 FINDING u_n IN AN ARITHMETIC SEQUENCE

Ex 5: What is u_6 for this sequence?

n	1	2	3	4	5	6
u_n	3	5	7	9	11	☐

Ex 6: What is u_6 for this sequence?

n	1	2	3	4	5	6
u_n	3	8	13	18	23	☐

Ex 7: What is u_5 for this sequence?

n	1	2	3	4	5
u_n	20	18	16	14	☐

Ex 8: What is u_6 for this sequence?

n	1	2	3	4	5	6
u_n	80	70	60	50	40	☐

B DEFINITION USING A RECURSIVE RULE

B.1 CALCULATING THE FIRST TERMS

Ex 9: Write the sequence defined by: the first term is 7, and each term is obtained by adding 4 to the previous term.

(☐, ☐, ☐, ☐, ☐, ...)

Ex 10: Write the sequence defined by: the first term is 1, and each term is obtained by multiplying the previous term by 2.

(☐, ☐, ☐, ☐, ☐, ...)

Ex 11: Write the sequence defined by: the first term is 10, and each term is obtained by subtracting 5 from the previous term.

(☐, ☐, ☐, ☐, ☐, ...)

Ex 12: Write the sequence defined by: the first term is 2.5, and each term is obtained by adding 0.5 to the previous term.

(☐, ☐, ☐, ☐, ☐, ...)

B.2 CALCULATING THE FIRST TERMS

Ex 13: Calculate the first terms of the sequence defined by:

$$u_0 = 3 \text{ and } u_{n+1} = u_n + 4.$$

- $u_1 =$ ☐
- $u_2 =$ ☐
- $u_3 =$ ☐
- $u_4 =$ ☐
- $u_5 =$ ☐

Ex 14: Calculate the first terms of the sequence defined by:

$$u_0 = 3 \text{ and } u_{n+1} = 2u_n.$$

- $u_1 =$ ☐
- $u_2 =$ ☐
- $u_3 =$ ☐
- $u_4 =$ ☐
- $u_5 =$ ☐

Ex 15: Calculate the first terms of the sequence defined by:

$$u_0 = 12 \text{ and } u_{n+1} = u_n - 10.$$

- $u_1 =$ ☐
- $u_2 =$ ☐
- $u_3 =$ ☐
- $u_4 =$ ☐

- $u_5 =$

Ex 16: Calculate the first terms of the sequence defined by:

$$u_0 = 64 \text{ and } u_{n+1} = \frac{u_n}{2}.$$

- $u_1 =$
- $u_2 =$
- $u_3 =$
- $u_4 =$
- $u_5 =$

B.3 IDENTIFYING THE RECURSIVE RULE

Ex 17: Given the sequence: $(3, 5, 7, 9, 11, 13, \dots)$

- The first term is .
- The rule is ☐ Add ☐ Subtract ☐ Multiply ☐ Divide

Ex 18: Given the sequence: $(60, 55, 50, 45, 40, 35, \dots)$

- The first term is .
- The rule is ☐ Add ☐ Subtract ☐ Multiply ☐ Divide

Ex 19: Given the sequence: $(64, 32, 16, 8, 4, 2, \dots)$

- The first term is .
- The rule is ☐ Add ☐ Subtract ☐ Multiply ☐ Divide

Ex 20: Given the sequence: $(1, 10, 100, 1\,000, 10\,000, \dots)$

- The first term is .
- The rule is ☐ Add ☐ Subtract ☐ Multiply ☐ Divide

B.4 IDENTIFYING THE RECURSIVE RULE

Ex 21: Given the sequence: $(3, 5, 7, 9, 11, 13, \dots)$, what is its recursive rule?

- $u_0 =$.
- $u_{n+1} =$

Ex 22: Given the sequence: $(100, 90, 80, 70, 60, \dots)$, what is its recursive rule?

- $u_0 =$.
- $u_{n+1} =$

Ex 23: Given the sequence: $(2, 6, 18, 54, 162, \dots)$, what is its recursive rule?

- $u_0 =$.
- $u_{n+1} =$

Ex 24: Given the sequence: $(8, 4, 2, 1, 0.5, 0.25, \dots)$, what is its recursive rule?

- $u_0 =$.
- $u_{n+1} =$

B.5 MODELING REAL SITUATIONS WITH SEQUENCES

Ex 25: A scientist observes a culture of bacteria. At the start, there are $u_0 = 5$ bacteria in a petri dish. Each day, the number of bacteria doubles.
Let u_n be the number of bacteria at the day n. What are the first three terms of the sequence (u_n)?

- $u_1 =$ bacteria
- $u_2 =$ bacteria
- $u_3 =$ bacteria

What is its recursive rule?

$$u_{n+1} =$$

Ex 26: Each day, I walk more and more steps. On day 0, I walk $u_0 = 1000$ steps. Each day, I walk 500 steps more than the day before.
Let u_n be the number of steps I have walked at the end of day n. What are the first three terms of the sequence (u_n)?

- $u_1 =$ steps
- $u_2 =$ steps
- $u_3 =$ steps

What is its recursive rule?

$$u_{n+1} = \boxed{}$$

Ex 27: Suppose I deposit \$100 in a savings account. Each year, my amount is multiplied by 1.1 (that is, it increases by 10% each year).
Let u_n be the amount of money in the account after n years. What are the first three terms of the sequence (u_n)?

- $u_0 = \boxed{}$ dollars
- $u_1 = \boxed{}$ dollars
- $u_2 = \boxed{}$ dollars

What is its recursive rule?

$$u_{n+1} = \boxed{}$$

Ex 28: At the start, I have $u_0 = 20$ dollars. Each week, my parents give me \$10 more.
Let u_n be the amount of money I have at the beginning of week n. What are the first three terms of the sequence (u_n)?

- $u_1 = \boxed{}$ dollars
- $u_2 = \boxed{}$ dollars
- $u_3 = \boxed{}$ dollars

What is its recursive rule?

$$u_{n+1} = \boxed{}$$

B.6 MODELING REAL SITUATIONS WITH SEQUENCES

Ex 29: A company has 200 employees in 2025. Each year, 10% of the employees leave the company, and the company hires 30 new employees.
Let (u_n) be the sequence corresponding to the number of employees in the company in $2025 + n$.

1. How many employees will there be in 2026?

$$\boxed{}$$

2. How many employees will there be in 2027?

$$\boxed{}$$

3. For all $n \in \mathbb{N}$, express u_{n+1} in terms of u_n.

$$u_{n+1} = \boxed{}$$

Ex 30: A gym has 200 members in 2025. Each year, the number of members increases by 10% through referrals, and the gym adds 20 new members from advertising.
Let (u_n) be the sequence corresponding to the number of members in the gym in $2025 + n$.

1. How many members will there be in 2026?

$$\boxed{}$$

2. How many members will there be in 2027?

$$\boxed{}$$

3. For all $n \in \mathbb{N}$, express u_{n+1} in terms of u_n.

$$u_{n+1} = \boxed{}$$

Ex 31: A school has 150 students in 2025. Each year, 20% of the students leave the school, and the school admits 50 new students.
Let (u_n) be the sequence corresponding to the number of students in the school in $2025 + n$.

1. How many students will there be in 2026?

$$\boxed{}$$

2. How many students will there be in 2027?

$$\boxed{}$$

3. For all $n \in \mathbb{N}$, express u_{n+1} in terms of u_n.

$$u_{n+1} = \boxed{}$$

Ex 32: A YouTube channel has 500 subscribers in 2025. Each year, the number of subscribers increases by 10% due to organic growth, and it gains 100 new subscribers from promotions.
Let (u_n) be the sequence corresponding to the number of subscribers to the channel in $2025 + n$.

1. How many subscribers will there be in 2026?

$$\boxed{}$$

2. How many subscribers will there be in 2027?

$$\boxed{}$$

3. For all $n \in \mathbb{N}$, express u_{n+1} in terms of u_n.

$$u_{n+1} = \boxed{}$$

C DEFINITION USING AN EXPLICIT RULE

C.1 CALCULATING TERMS FROM AN EXPLICIT FORMULA

Ex 33: Consider the sequence defined by the explicit formula: $u_n = 3n + 2$.
Write the first four terms of this sequence.

- $u_0 = \boxed{}$

- $u_1 = \square$
- $u_2 = \square$
- $u_3 = \square$

Ex 34: Consider the sequence defined by the explicit formula: $u_n = -10n + 100$.
Write the first four terms of this sequence.

- $u_0 = \square$
- $u_1 = \square$
- $u_2 = \square$
- $u_3 = \square$

Ex 35: Consider the sequence defined by the explicit formula: $u_n = n^2 + 2$.
Write the first four terms of this sequence.

- $u_0 = \square$
- $u_1 = \square$
- $u_2 = \square$
- $u_3 = \square$

C.2 MODELING REAL SITUATIONS WITH SEQUENCES

Ex 36: You start with \$30 and each week your parent gives you \$10.
The amount of money you have after n weeks is given by the formula:

$$\begin{aligned} u_n &= \text{Initial Amount} + \text{Nbr weeks} \times \text{Amount received each week} \\ &= 30 + n \times 10 \\ &= 30 + 10n \end{aligned}$$

where u_n is the amount after n weeks. How much money will you have after 20 weeks?

$\square$ dollars

Ex 37: You deposit \$1 500 in a savings account that pays simple interest at a rate of 4% per year.
The amount of money in your account after n years is given by the formula:

$$\begin{aligned} u_n &= \text{Initial Amount} + \text{Nbr years} \times \text{Percentage of the initial amount} \\ &= 1\,500 + n \times 0.04 \times 1\,500 \\ &= 1\,500 + 60n \end{aligned}$$

where u_n is the amount after n years. What is your amount at year 20?

$\square$ dollars

Ex 38: You start a stamp collection with 12 stamps. Each month, you add 4 new stamps to your collection.
The number of stamps you have after n months is given by the formula:

$$\begin{aligned} u_n &= \text{Initial number of stamps} + \text{Nbr months} \times \text{Stamps added per month} \\ &= 12 + n \times 4 \\ &= 12 + 4n \end{aligned}$$

where u_n is the number of stamps after n months. How many stamps will you have after 15 months?

$\square$ stamps

Ex 39: A school plants 5 trees in its garden to start. Every year, they plant 3 new trees.
The total number of trees after n years is given by the formula:

$$\begin{aligned} u_n &= \text{Initial number of trees} + \text{Nbr years} \times \text{Trees planted per year} \\ &= 5 + n \times 3 \\ &= 5 + 3n \end{aligned}$$

where u_n is the number of trees after n years. How many trees will there be after 12 years?

$\square$ trees

D ARITHMETIC SEQUENCES

D.1 STUDYING AN ARITHMETIC SEQUENCE

Ex 40: Consider the sequence $(5,\ 8,\ 11,\ 14,\ 17, \ldots)$

1. - $u_1 - u_0 = \square$
   - $u_2 - u_1 = \square$
   - $u_3 - u_2 = \square$
2. Show that the sequence is arithmetic.

   ☐ The ratio of consecutive terms is constant.

   ☐ The difference between consecutive terms is constant.
3. What is its recursive rule?

   $$u_{n+1} = \square$$
4. What is its explicit rule?

   $$u_n = \square$$
5. Find the 50th term of the sequence.

   $$u_{50} = \square$$

Ex 41: Consider the sequence $(4,\ 9,\ 14,\ 19, \ldots)$

1. - $u_1 - u_0 = \square$
   - $u_2 - u_1 = \square$
   - $u_3 - u_2 = \square$
2. Show that the sequence is arithmetic.

   ☐ The ratio of consecutive terms is constant.

   ☐ The difference between consecutive terms is constant.
3. What is its recursive rule?

   $$u_{n+1} = \square$$
4. What is its explicit rule?

   $$u_n = \square$$

5. Find the 50th term of the sequence.

$$u_{50} = \square$$

Ex 42: Consider the sequence $(125,\ 115,\ 105,\ 95,\ \ldots)$

1.
   - $u_1 - u_0 = \square$
   - $u_2 - u_1 = \square$
   - $u_3 - u_2 = \square$
2. Show that the sequence is arithmetic.
   ☐ The ratio of consecutive terms is constant.
   ☐ The difference between consecutive terms is constant.
3. What is its recursive rule?

$$u_{n+1} = \square$$

4. What is its explicit rule?

$$u_n = \square$$

5. Find the 1000th term of the sequence.

$$u_{1000} = \square$$

D.2 DETERMINING THE EXPLICIT RULE OF AN ARITHMETIC SEQUENCE GIVEN TWO TERMS

Ex 43: For the arithmetic sequence given that $u_2 = 11$ and $u_6 = 31$, what is its explicit rule?

$$u_n = \square$$

Ex 44: For the arithmetic sequence given that $u_1 = 7$ and $u_{20} = 45$, what is its explicit rule?

$$u_n = \square$$

Ex 45: For the arithmetic sequence given that $u_3 = 32$ and $u_{20} = 202$, what is its explicit rule?

$$u_n = \square$$

D.3 FINDING THE TERM NUMBER IN AN ARITHMETIC SEQUENCE

Ex 46: For an arithmetic sequence (u_n) with common difference $d = 2$ and $u_0 = 1$, find n for $u_n = 21$.

$$n = \square$$

Ex 47: For an arithmetic sequence (u_n) with common difference $d = 4$ and $u_0 = -6$, find n for $u_n = 38$.

$$n = \square$$

Ex 48: For an arithmetic sequence (u_n) with common difference $d = -3$ and $u_0 = 20$, find n for $u_n = 2$.

$$n = \square$$

Ex 49: For an arithmetic sequence (u_n) with common difference $d = \frac{1}{2}$ and $u_0 = 2$, find n for $u_n = 6$.

$$n = \square$$

D.4 MODELING REAL SITUATIONS

Ex 50: You start with \$30 and each week your parent gives you \$10.
Let u_n be the amount of money you have after n weeks.

1. Find the explicit formula for u_n.

$$u_n = \square$$

2. How much money will you have after 20 weeks?

☐ dollars

Ex 51: You deposit \$1 500 in a savings account that pays simple interest at a rate of 4% per year.
Let u_n be the amount of money in your account after n years.

1. Find the explicit formula for u_n.

$$u_n = \square$$

2. What is your amount at year 20?

☐ dollars

Ex 52: You start a stamp collection with 12 stamps. Each month, you add 4 new stamps to your collection.
Let u_n be the number of stamps you have after n months.

1. Find the explicit formula for u_n.

$$u_n = \square$$

2. How many stamps will you have after 15 months?

☐ stamps

Ex 53: A school plants 5 trees in its garden to start. Every year, they plant 3 new trees.
Let u_n be the total number of trees after n years.

1. Find the explicit formula for u_n.

$$u_n = \square$$

2. How many trees will there be after 12 years?

☐ trees

E GEOMETRIC SEQUENCES

E.1 STUDYING A GEOMETRIC SEQUENCE

Ex 54: Consider the sequence $(3,\ 6,\ 12,\ 24,\ 48,\ \ldots)$

1. - $u_1 \div u_0 =$ ☐
   - $u_2 \div u_1 =$ ☐
   - $u_3 \div u_2 =$ ☐
2. Show that the sequence is geometric.
   ☐ The ratio between consecutive terms is constant.
   ☐ The difference between consecutive terms is constant.
3. What is its recursive rule?
   $$u_{n+1} = \square$$
4. What is its explicit rule?
   $$u_n = \square$$
5. Find the 10th term of the sequence.
   $$u_{10} = \square$$

Ex 55: Consider the sequence $(1,\ -1,\ 1,\ -1,\ 1,\ \ldots)$

1. - $u_1 \div u_0 =$ ☐
   - $u_2 \div u_1 =$ ☐
   - $u_3 \div u_2 =$ ☐
2. Show that the sequence is geometric.
   ☐ The ratio between consecutive terms is constant.
   ☐ The difference between consecutive terms is constant.
3. What is its recursive rule?
   $$u_{n+1} = \square$$
4. What is its explicit rule?
   $$u_n = \square$$
5. Find the 10th term of the sequence.
   $$u_{10} = \square$$

Ex 56: Consider the sequence $(4,\ 2,\ 1,\ 0.5,\ 0.25,\ \ldots)$

1. - $u_1 \div u_0 =$ ☐
   - $u_2 \div u_1 =$ ☐
   - $u_3 \div u_2 =$ ☐
2. Show that the sequence is geometric.
   ☐ The ratio between consecutive terms is constant.
   ☐ The difference between consecutive terms is constant.
3. What is its recursive rule?
   $$u_{n+1} = \square$$
4. What is its explicit rule?
   $$u_n = \square$$
5. Find the 10th term of the sequence.
   $$u_{10} = \square$$

E.2 FINDING THE TERM NUMBER IN AN GEOMETRIC SEQUENCE

Ex 57: For a geometric sequence (u_n) with common ratio $r = 2$ and $u_0 = 1$, find n for $u_n = 8$.

$$n = \square$$

Ex 58: For a geometric sequence (u_n) with common ratio $r = 3$ and $u_0 = 1$, find n for $u_n = 81$.

$$n = \square$$

Ex 59: For a geometric sequence (u_n) with common ratio $r = 10$ and $u_0 = 2$, find n for $u_n = 2000$.

$$n = \square$$

Ex 60: For a geometric sequence (u_n) with common ratio $r = 2$ and $u_0 = 10$, find n for $u_n = 160$.

$$n = \square$$

E.3 MODELING REAL SITUATIONS

Ex 61: A scientist observes a culture of bacteria. At the start, there are $u_0 = 5$ bacteria in a petri dish. Each day, the number of bacteria doubles.
Let u_n be the number of bacteria at the day n.

1. What are the first three terms of the sequence (u_n)?
   - $u_1 =$ ☐ bacteria
   - $u_2 =$ ☐ bacteria
   - $u_3 =$ ☐ bacteria
2. What is its recursive rule?
   $$u_{n+1} = \square$$

3. What is its explicit rule?

$$u_n = \square$$

4. How many bacteria will there be after 10 days?

$$u_{10} = \square \text{ bacteria}$$

Ex 62: An investor starts with \$100 in a high-risk fund. Each year, the value of the investment triples.
Let u_n be the value of the investment after n years.

1. What are the first three terms of the sequence (u_n)?
   - $u_1 = \square$ dollars
   - $u_2 = \square$ dollars
   - $u_3 = \square$ dollars
2. What is its recursive rule?

$$u_{n+1} = \square$$

3. What is its explicit rule?

$$u_n = \square$$

4. How many dollars will the investment be worth after 10 years?

$$u_{10} = \square \text{ dollars}$$

Ex 63: A computer virus infects 4 computers initially. Each day, the number of infected computers quadruples.
Let u_n be the number of infected computers at day n.

1. What are the first three terms of the sequence (u_n)?
   - $u_1 = \square$ computers
   - $u_2 = \square$ computers
   - $u_3 = \square$ computers
2. What is its recursive rule?

$$u_{n+1} = \square$$

3. What is its explicit rule?

$$u_n = \square$$

4. How many computers will be infected after 10 days?

$$u_{10} = \square \text{ computers}$$

Ex 64: You deposit \$1000 in a savings account that earns 5% compound interest per year. Compound interest means that each year, interest is calculated on the current balance (principal plus any previously earned interest), and added to the balance.
Let u_n be the amount in the account after n years.

1. What are the first three terms of the sequence (u_n)?
   - $u_1 = \square$ dollars
   - $u_2 = \square$ dollars
   - $u_3 = \square$ dollars
2. What is its recursive rule?

$$u_{n+1} = \square$$

3. What is its explicit rule?

$$u_n = \square$$

4. How many dollars will be in the account after 10 years? (Round to two decimal places if necessary.)

$$u_{10} = \square \text{ dollars}$$

Ex 65: You buy a car for \$10,000. It depreciates at a rate of 20% per year. Depreciation means that each year, the value decreases by 20% of the current value, so the remaining value is 80% of the previous year's value. Thus, the value multiplies by 0.8 each year.
Let u_n be the value of the car after n years. What are the first three terms of the sequence (u_n)?

1. - $u_1 = \square$ dollars
   - $u_2 = \square$ dollars
   - $u_3 = \square$ dollars
2. What is its recursive rule?

$$u_{n+1} = \square$$

3. What is its explicit rule?

$$u_n = \square$$

4. How many dollars will the car be worth after 10 years? (Round to two decimal places if necessary.)

$$u_{10} = \square \text{ dollars}$$

F SERIES

F.1 COMPUTING TERMS AND SUMS OF SEQUENCES: LEVEL 1

Ex 66: Consider the sequence, (u_n), defined by $(2, 5, 8, 11, \dots)$. Find

1. $u_0 = \square$
2. $u_1 = \square$
3. $u_2 = \square$
4. $S_0 = \square$

5. $S_1 = \square$
6. $S_2 = \square$

Ex 67: Consider the sequence (u_n) defined by $(2, 4, 8, 16, 32, \ldots)$. Find:

1. $u_0 = \square$
2. $u_1 = \square$
3. $u_2 = \square$
4. $S_0 = \square$
5. $S_1 = \square$
6. $S_2 = \square$

Ex 68: Consider the sequence (u_n) defined by $(5, -5, -15, -25, \ldots)$. Find:

1. $u_0 = \square$
2. $u_1 = \square$
3. $u_2 = \square$
4. $S_0 = \square$
5. $S_1 = \square$
6. $S_2 = \square$

F.2 COMPUTING TERMS AND SUMS OF SEQUENCES: LEVEL 2

Ex 69: For the sequence (u_n) defined by $u_n = n^2$, find:

$$S_3 = \square$$

Ex 70: For the sequence (u_n) defined by $u_0 = 2$ and $u_{n+1} = 2u_n - 1$, find:

$$S_3 = \square$$

Ex 71: For the sequence (u_n) defined by $u_n = n^2 - 5n$, find:

$$S_3 = \square$$

Ex 72: For the sequence (u_n) defined by $u_{n+1} = u_n + n$ with $u_0 = 2$, find:

$$S_3 = \square$$

G SUM OF AN ARITHMETIC SEQUENCE

G.1 CALCULATING SUMS OF ARITHMETIC SEQUENCES: LEVEL 1

Ex 73: Calculate the sum

$$1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 + 11 = \square$$

Ex 74: Calculate the sum

$$5 + 10 + 15 + 20 + 25 + 30 + 35 + 40 + 45 + 50 = \square$$

Ex 75: Calculate the sum

$$5 + 11 + 17 + 23 + 29 + 35 + 41 + 47 = \square$$

G.2 CALCULATING SUMS OF ARITHMETIC SEQUENCES: LEVEL 2

Ex 76: Calculate the sum

$$3 + 7 + 11 + 15 + \cdots + 103 = \square$$

Ex 77: Calculate the sum

$$6 + 9 + 12 + \cdots + 48 = \square$$

Ex 78: Calculate the sum

$$20 + 17 + 14 + \cdots + (-1) = \square$$

Ex 79: Calculate the sum

$$4 + 8 + 12 + \cdots + 40 = \square$$

H SUM OF AN GEOMETRIC SEQUENCE

H.1 CALCULATING SUMS OF GEOMETRIC SEQUENCES BY DIRECT ADDITION

Ex 80: Calculate the sum by adding the terms directly

$$1 + 2 + 4 + 8 + 16 = \square$$

Ex 81: Calculate the sum by adding the terms directly

$$3^0 + 3^1 + 3^2 + 3^3 + 3^4 + 3^5 = \square$$

Ex 82: Calculate the sum by adding the terms directly

$$2^0 + 2^1 + 2^2 + 2^3 + 2^4 + 2^5 = \boxed{}$$

Ex 83: Calculate the sum by adding the terms directly

$$2 \times 10^0 + 2 \times 10^1 + 2 \times 10^2 + 2 \times 10^3 + 2 \times 10^4 = \boxed{}$$

H.2 CALCULATING SUMS OF GEOMETRIC SEQUENCES: LEVEL 1

Ex 84: Calculate the sum

$$3^0 + 3^1 + 3^2 + 3^3 + 3^4 + \cdots + 3^{10} = \boxed{}$$

Ex 85: Calculate the sum

$$2^0 + 2^1 + 2^2 + 2^3 + 2^4 + \cdots + 2^9 = \boxed{}$$

Ex 86: Calculate the sum

$$3 \times 5^0 + 3 \times 5^1 + 3 \times 5^2 + \cdots + 3 \times 5^6 + 3 \times 5^7 = \boxed{}$$

Ex 87: Calculate the sum

$$5 \times 4^0 + 5 \times 4^1 + 5 \times 4^2 + \cdots + 5 \times 4^8 = \boxed{}$$

H.3 CALCULATING SUMS OF GEOMETRIC SEQUENCES: LEVEL 2

Ex 88: Calculate the sum

$$1 + 2 + 4 + 8 + \cdots + 256 = \boxed{}$$

Ex 89: Calculate the sum

$$2 + 6 + 18 + 54 + 162 + 486 + 1458 = \boxed{}$$

Ex 90: Calculate the sum

$$3 + 15 + \cdots + 1171875 = \boxed{}$$