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 IDENTIFYING THE RECURSIVE RULE

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

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

Ex 14: Given the sequence: $(60, 55, 50, 45, 40, 35, \dots)$

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

Ex 15: Given the sequence: $(64, 32, 16, 8, 4, 2, \dots)$

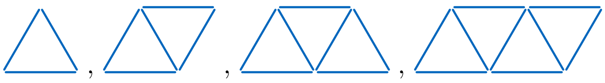
- The first term is ☐.
- The rule is ☐ Add ☐ Subtract ☐ Multiply ☐ Divide ☐

Ex 16: Given the sequence: $(1, 10, 100, 1\,000, 10\,000, \dots)$

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

B.3 IDENTIFYING THE RECURSIVE RULE IN GEOMETRIC PATTERNS

Ex 17: Observe the following pattern made with sticks:

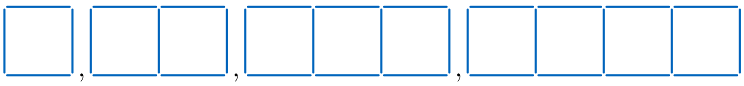


Fill in the table below:

Diagram number	1	2	3	4
Number of sticks				

What rule can you find for the number of sticks?
Start with ☐ sticks. Add ☐ sticks for the next diagram.

Ex 18: Observe the following pattern made with sticks:

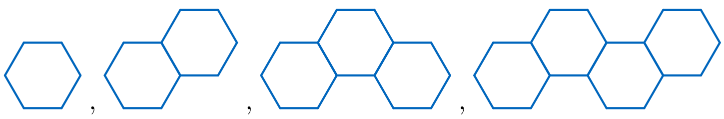


Fill in the table below:

Diagram number	1	2	3	4
Number of sticks				

What rule can you find for the number of sticks?
Start with ☐ sticks. Add ☐ sticks for the next diagram.

Ex 19: Observe the following pattern made with sticks:



Fill in the table below:

Diagram number	1	2	3	4
Number of sticks				

What rule can you find for the number of sticks?
Start with ☐ sticks. Add ☐ sticks for the next diagram.

Ex 20: Observe the following pattern made with sticks:

Fill in the table below:

Diagram number	1	2	3	4
Number of sticks				

What rule can you find for the number of sticks?
Start with ☐ sticks. Add ☐ sticks for the next diagram.

B.4 MODELING REAL SITUATIONS WITH SEQUENCES

Ex 21: 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 five terms of the sequence (u_n)?

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

Ex 22: Let u_n be the number of steps I have walked at the end of day n.On day 0, I walk $u_0 = 1000$ steps. Each day, I walk 500 more steps than the previous day.
What are the first terms of the sequence (u_n)?

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

Ex 23: Suppose I deposit \$100 in a savings account. Each year, my amount is multiplied by 1.1 (that is, it increases by 10% every year).
Let u_n be the amount of money in the account after n years. What are the first five terms of the sequence (u_n)?

- $u_0 =$ ☐ dollars
- $u_1 =$ ☐ dollars
- $u_2 =$ ☐ dollars
- $u_3 =$ ☐ dollars
- $u_4 =$ ☐ dollars

Ex 24: Let u_n be the amount of money I have at the beginning of week n.At the start, I have $u_0 = 20$ dollars. At the end of each week, my parents give me \$ 10 more.
What are the first terms of the sequence (u_n)?

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

C DEFINITION USING AN EXPLICIT RULE

C.1 CALCULATING TERMS FROM AN EXPLICIT FORMULA

Ex 25: Consider the sequence defined by the explicit formula: $u_n = 3n + 2$.
Write the first four terms of this sequence.

- $u_0 =$ ☐
- $u_1 =$ ☐
- $u_2 =$ ☐
- $u_3 =$ ☐

Ex 26: Consider the sequence defined by the explicit formula: $u_n = -10n + 100$.
Write the first four terms of this sequence.

- $u_0 =$ ☐
- $u_1 =$ ☐
- $u_2 =$ ☐
- $u_3 =$ ☐

Ex 27: Consider the sequence defined by the explicit formula: $u_n = n^2 + 2$.
Write the first four terms of this sequence.

- $u_0 =$ ☐
- $u_1 =$ ☐
- $u_2 =$ ☐
- $u_3 =$ ☐

Ex 28: Consider the sequence defined by the explicit formula: $u_n = (n + 1)n$.
Write the first four terms of this sequence.

- $u_0 =$ ☐
- $u_1 =$ ☐
- $u_2 =$ ☐
- $u_3 =$ ☐

C.2 MODELING REAL SITUATIONS WITH SEQUENCES

Ex 29: 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?

☐ dollars

Ex 30: 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:

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

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

☐ dollars

Ex 31: 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:

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

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

☐ stamps

Ex 32: 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?

☐ trees