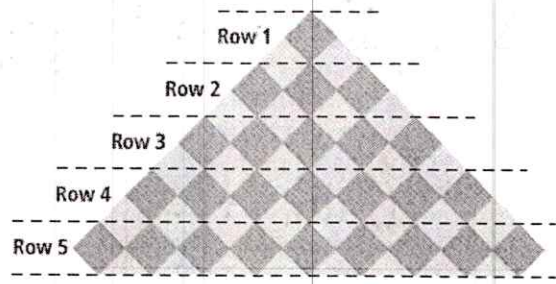# Topic 3.4 – Arithmetic Sequences

Explore & Reason

A fashion designer is designing a patterned fabric.

A. There are 5 shaded squares in row 3. The total number of shaded squares up to and including row 3 is 9. Fill in the table for the remaining rows.

Row 1
Row 2
Row 3
Row 4
Row 5

Row Number	1	2	3	4	5
Number of Shaded Squares in the Row	1		5		
Total Number of Shaded Squares	1		9		

B. What number patterns do you see in the rows of the table?

Definintions

Sequence an ordered list of numbers that often forms a pattern

Term of sequence each number in the sequence

1st ↓ 2nd ↓

$2, 4, 6, 8, \ldots$

Common difference the constant difference between any two consecutive ~~numbers~~ terms "Subtraction/adding"

Aritmetic sequence a sequence that has a common difference

EXAMPLE 1

A. Is the ordered list 26, 39, 52, 65, 78 an arithmetic sequence?

adding 13 each

Arithmetic

B. How do you represent sequences using subscript notation?

$a_1 = 26$ $a_3 = 52$

1st term is 26 3rd term is 52

Try it... Are the following an arithmetic sequence?

a) 2, 6, 10, 14, ...

Arithmetic

$d = 4$

b) 2, 4, 8, 16, ...

no

Recursive Formula:

1st term

$$a_1 = \underline{}$$

nth term → $a_n = a_{n-1} + \boxed{d}$ ← common difference

↑ previous term

EXAMPLE 2

A. What is a recursive formula for the height above the ground of the nth step of the pyramid shown?

$$a_1 = 26$$
$$a_n = a_{n-1} + 26$$

B. Find the height above the ground of the 3rd step.

26 →(+26) 52 →(+26) 78

$$\boxed{78 \text{ cm}}$$

Each step is 26 cm tall.

+26

26

Try it... What if the stair height is 18cm tall now?

$$a_1 = 18$$
$$a_n = a_{n-1} + 18$$

Explicit Formula:

$$a_n = a_1 + (n-1)d$$

1st term   common difference

EXAMPLE 3

A. The cost of renting a bicycle is given in the table. How can you represent the rental cost using an explicit formula?

Number of days rented	1	2	3	4
Rental cost	26	38	50	62

+12

$$a_n = 26 + (n-1)12$$
$$a_n = 26 + 12n - 12 \qquad \boxed{a_n = 12n + 14}$$

B. What is the cost of renting the bicycle for 10 days?

$$a_{10} = 12(10) + 14 \qquad \text{n=10}$$
$$= 120 + 14 \qquad \boxed{\$134}$$
$$= 134$$

C. How is the explicit formula of an arithmetic sequence related to a linear function?

Try it... Cost is $28 for first day then $2 more each day

HW: pg 116 # 17-39 odd, 47

Due Thursday

Go through all past ~~two~~ one graphs

3.4.29