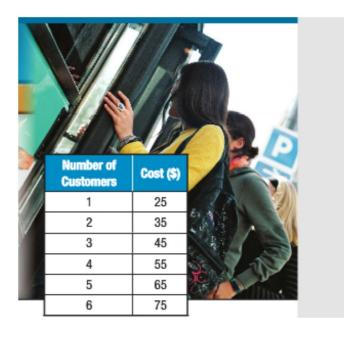Algebra 1   7.8
Use a recursive formula to list terms in a sequence
Write recursive formulas for arithmetic and geometric sequences

Write an explicit formula $a_1 =$ $a_n =$
sequence
arithmetic sequence $n \geq 2$
common difference (d)
geometric sequence
common ratio (r)
* explicit formula
recursive formula
whiteboards

Number of Customers	Cost ($)
1	25
2	35
3	45
4	55
5	65
6	75

$-2, 10, -50 \ldots$

$$y = -2(-5)^{n-1}$$

11th

$y = -2(-5)^{10}$

1) -2
2) $10 \quad -2 \cdot r$
3) $-50 \quad -2 \cdot r \cdot r$

Find the first five terms of each sequence.

1. $a_1 = 16$, $a_n = a_{n-1} - 3$, $n \geq 2$

1	16	$16 - 3$
2	13	$13 - 3$
3	10	$10 - 3$
4	7	$7 - 3$
5	4	

2. $a_1 = -5$, $a_n = 4a_{n-1} + 10$, $n \geq 2$

1	-5	$-5 \cdot 4 + 10$
2	-10	$-10 \cdot 4 + 10$
3	-30	$-30 \cdot 4 + 10$
4	-110	$-110 \cdot 4 + 10$
5	-430	

Write a recursive formula for each sequence

3. 1, 6, 11, 16, …

$a_1 = 1$

$a_n = a_{n-1} + 5$

$n \geq 2$

1	1
2	6
3	11
4	16

4. 4, 12, 36, 108, …

1	4
2	12
3	36
4	108

$a_1 = 4 \qquad a_n = 3 \cdot a_{n-1}$

$n \geq 2$

$a_n = 2 + (n-1)3$

$a_n = 3(4)^{n-1}$

$2 + 9 \cdot 3 = 29$

$3 \cdot 4^7$

To write an explicit formula:
Which kind is it? (x or +)

What is the relationship?
Put in first term and simplify

$d = $ common difference

Previous chapter(s):
$+$, $a_n = a_1 + (n-1)d$
$\times$ $a_n = a_1(r)^{(n-1)}$

$r = $ common ratio

4B. Write an explicit formula for $a_1 = -16$, $a_n = a_{n-1} - 7$, $n \geq 2$.

1	-16	$-16 - 7$
2	-23	$-23 - 7$
3	-30	$-30 - 7$
4	-37	

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

$$a_n = -16 + (n-1)(-7)$$

$$a_n = -16 + (11)(-7)$$

$$= -16 + -77$$

$$= -93$$

(1) Write the first 3 or 4 terms

2. What is the rule? (template)

3. Substitute & simplify

$$a_n = a_1 + (n-1)d$$
$$a_n = a_1(r)^{(n-1)}$$

b. Write an explicit formula for $a_1 = 120$, $a_n = \boxed{0.8a_{n-1}}$, $n \geq 2$.

n	
1	120
2	96
3	76.8
4	61.44

$$a_n = a_1 (r)^{n-1}$$

$$a_n = 120(.8)^{n-1}$$

t

1. Write the first 3 or 4 terms

2. What is the rule? (template)

3. Substitute & simplify

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

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

$a_n = a_1 (r)^{(n-1)}$

For each recursive formula, write an explicit formula. For each explicit formula, write a recursive formula.

(yesterday)

6. $a_1 = 4, a_n = a_{n-1} + 16, n \geq 2$ 7 $a_n = 5n + 8$

1	4
2	20
3	36
4	52

$$a_n = a_1 + (n-1)d$$
$$= 4 + (n-1) \cdot 16$$

1	$5 \cdot 1 + 8$	13
2	$5 \cdot 2 + 8$	18
3	$5 \cdot 3 + 8$	23
4	$5 \cdot 4 + 8$	28

$a_1 = 13$ $a_n = a_{n-1} + 5$
$n \geq 2$

$a_n = a_1 + (n-1)d$
$a_n = a_1(r)^{(n-1)}$