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

sequence

arithmetic sequence

common difference (d)

geometric sequence

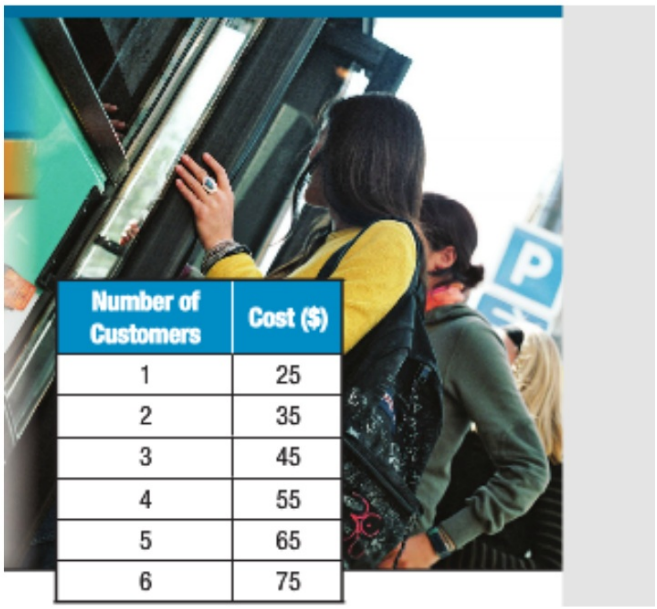
common ratio (r)

explicit formula

recursive formula

whiteboards

| | |
|---|---|
| 1 | 25 |
| 2 | 35 |
| 3 | 45 |
| 4 | 55 |
| 5 | 65 |
| 6 | 75 |
| 7 | 85 |
| 8 | 95 |
| 9 | 105 |
| 10 | 115 |



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

**GuidedPractice**

**2A.** 4, 10, 25, 62.5, ...

$a_1 = 4$ $\quad a_n = 2.5(a_{n-1}) \quad n \geq 2$

start rule $n \geq 2$

**Find the first five terms of each sequence.**

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

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

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

| | | |
|---|---|---|
| 1 | $-5$ | $-5$ |
| 2 | $-20+10$ | $-10$ |
| 3 | $4 \cdot -10+10$ | $-30$ |
| 4 | $4 \cdot -30+10$ | $-110$ |
| 5 | $4 \cdot -110+10$ | $-430$ |

**Write a recursive formula for each sequence**

**3.** 1, 6, 11, 16, …

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

**4.** 4, 12, 36, 108, ...

$a_1 = 4$ $\qquad a_n = 3 \cdot a_{n-1} \qquad n \geq 2$

$(a_{n-1}) \cdot 3$

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

What is the relationship?
Put in first term and simplify

A

G

Previous chapter(s):

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

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

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

$-16, -23, -30, -37$

| | |
|---|---|
| 1 | -16 |
| 2 | -23 |
| 3 | -30 |
| 4 | -37 |

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

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

$= -16 + -7n + 7$

$a_n = -9 + -7n$

$y = -7n - 9$

1. Write the first 3 or 4 terms
2. What is the rule? (template)
3. Substitute & simplify

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

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

PeMDAS

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

t

| | |
|---|---|
| 1 | 120 |
| 2 | 96 |
| 3 | 76.8 |
| 4 | 61.44 |

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

$a_n = 120(0.8)^{n-1}$

$y = 120(0.8)^{n-1}$

~~1.~~ Write the first 3 or 4 terms

2. What is the rule? (template)

3. Substitute & simplify

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

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

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

R → E

E → R

Whiteboards

R → E

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

| | |
|---|---|
| 1 | 4 |
| 2 | 20 |
| 3 | 36 |
| 4 | 52 |

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

$a_n = 4 + (n-1)(16)$

$= 4 + 16n + -16$

$y = 16n - 12$

(yesterday)

**7** $a_n = 5n + 8$ E → R

| | |
|---|---|
| 1 | 13 |
| 2 | 18 |
| 3 | 23 |
| 4 | 28 |

$a_1 = 13$ $a_n = (a_{n-1}) + 5$

$n \geq 2$

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

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

WB 7.8