

Name: KEY

Date: _____

1. Given the arithmetic sequence, write the explicit formula then find the 32nd term.

a) 3, 7, 11, 15, 19, 23, ... $d=4$

$$a_n = 3 + (n-1)(4)$$

$$a_n = 3 + 4n - 4$$

$$a_{32} = 4(32) + 1$$

$$a_{32} = 127$$

b) 110, 103, 96, 89, 82, 75, ... $d=-7$

$$a_n = 110 + (n-1)(-7)$$

$$a_n = 110 - 7n + 7$$

$$a_n = -7n + 117$$

$$a_{32} = -7(32) + 117$$

$$a_{32} = -107$$

Write the first 5 terms for the following sequences:

2. $a_n = a_{n-1} - 9$
 $a_0 = 36$

$a_1 = 36 - 9 = 27$ 27, 18, 9, 0, -9
 $a_2 = 27 - 9 = 18$
 $a_3 = 18 - 9 = 9$
 $a_4 = 9 - 9 = 0$
 $a_5 = 0 - 9 = -9$

3. $a_n = 2a_{n-1} - 10$
 $a_0 = 20$

$a_1 = 2(20) - 10 = 30$ 30, 50, 90, 170
 $a_2 = 2(30) - 10 = 50$ 330
 $a_3 = 2(50) - 10 = 90$
 $a_4 = 2(90) - 10 = 170$
 $a_5 = 2(170) - 10 = 330$

4. $a_n = \frac{2 + a_{n-1}}{2}$
 $a_0 = 10$

$a_1 = \frac{2 + 10}{2} = 6$ $a_4 = \frac{3 + 2}{2} = \frac{5}{2}$
 $a_2 = \frac{6 + 2}{2} = 4$ $a_5 = \frac{2 + \frac{5}{2}}{2} = \frac{9}{2}$
 $a_3 = \frac{4 + 2}{2} = 3$ $= \frac{9}{4} = 2.25$
 6, 4, 3, $\frac{5}{2}$, 2.25

5. $a_n = 2a_{n-1} + 3a_{n-2}$
 $a_0 = 5$ & $a_1 = 4$

$a_2 = 2(4) + 3(5) = 23$
 $a_3 = 2(23) + 3(4) = 58$
 $a_4 = 2(58) + 3(23) = 185$
 $a_5 = 2(185) + 3(58) = 544$

Write the a recursive formula and an explicit formula for each of the following sequences:

6. -15, -12, -9, -6, -3, 0, ...

-3 Recursive Formula:
 $a_n = a_{n-1} + 3$
 $a_0 = -15$

Explicit Formula:
 $a_n = 3n - 15$

7. 15, 215, 415, 615, 815, ...

-185 Recursive Formula:
 $a_n = a_{n-1} + 200$
 $a_0 = -185$

Explicit Formula:
 $a_n = 200n - 185$

8. Your phone service allows you to add international long distance to your phone. The cost is a \$10 flat fee each month and 15¢ a minute for calls made.

a) Write a recursive rule describing your monthly cost for international calls.

$$a_n = 0.15n + 10, n \geq 0$$

switch

b) Write an explicit rule for the n minutes of calls made in a month.

$$a_0 = 10, a_n = a_{n-1} + 0.15, n \geq 0$$

c) How much would it cost you to talk for 35 minutes?

$$a_{35} = 0.15(35) + 10 = \$15.25$$

d) If you have AT MOST \$250 to spend on long distance phone calls, how many minutes can you spend talking on the phone?

$$0.15n + 10 \leq 250$$

$$0.15n \leq 240$$

$$n \leq 1600$$

you can spend at most 1600 minutes talking on the phone.

AMDM Day 4 Recursive and Explicit Sequences

1. Your local cable company offers 2 different combination plans for cable, internet, and phone services.

Plan A- You pay \$59 per month for cable service plus high speed internet. Premium channels are available for a surcharge of \$5.00 per channel.

Plan B- You pay \$89 per month for cable, internet, and phone. Premium channels are available for \$3.75 per channel.

a. Fill in the table for the cost of each plan:

Plan A	
# premium channels	cost
0	59
1	$59 + 5 = 64$
2	$64 + 5 = 69$
3	$69 + 5 = 74$
4	$74 + 5 = 79$
5	$79 + 5 = 84$

Plan B	
# premium channels	cost
0	89
1	$89 + 3.75 = 92.75$
2	$92.75 + 3.75 = 96.5$
3	$96.5 + 3.75 = 100.25$
4	$100.25 + 3.75 = 104$
5	$104 + 3.75 = 107.75$

b. Write the recursive rule for each plan.

Plan A

$$a_n = a_{n-1} + 5, a_0 = 59$$

Plan B

$$a_n = a_{n-1} + 3.75, a_0 = 89$$

c. Write the explicit rule for each plan:

Plan A

$$a_n = 5n + 59$$

Plan B

$$a_n = 3.75n + 89$$

d. Find the cost of 18 premium channels on Plan B.

$$a_{18} = 3.75(18) + 89 = 156.5$$

$$\boxed{\$156.50}$$

e. Find the number of premium channels bought where the 2 plans would have the same cost.

$$\begin{array}{r} 5n + 59 = 3.75n + 89 \\ -3.75n - 59 \quad -3.75n \quad -59 \\ \hline 1.25n = 30 \end{array}$$

$$1.25n = 30$$

$$\boxed{n = 24}$$

24 channels

AMDM Day 4 Recursive and Explicit Sequences

2. On black Friday, Price Buster decided to reward it's loyal customers with some great deals on video games.

Deal 1: You could buy a video game card for 15 dollars. Now each time you play video game it only costs \$2.99.

Deal 2: Each game you buy costs \$7.99.

a. Fill in the table for the cost of each deal:

Deal 1	
# video games	cost
0	15
1	$15 + 2.99 = 17.99$
2	20.98
3	23.97
4	26.96
5	29.95

Deal 2	
# video games	cost
0	0
1	7.99
2	15.98
3	23.97
4	31.96
5	39.95

b. Write the recursive rule for each plan.

Deal 1

$$a_n = a_{n-1} + 2.99, a_0 = 15$$

Deal 2

$$a_n = a_{n-1} + 7.99, a_0 = 0$$

c. Write the explicit rule for each plan:

Deal 1

$$a_n = 2.99n + 15$$

Deal 2

$$a_n = 7.99n$$

d. Find the cost of 21 video games on Deal 1 (hey, it's almost Christmas break, you'll have time!).

$$a_{21} = 2.99(21) + 15$$

$$a_{21} = \$77.79$$

e. Find the number of video games bought where the 2 deals would have the same cost.

$$2.99n + 15 = 7.99n$$

$$15 = 5n$$

$$\boxed{n=3}$$

3 video games

AMDM Day 4 Recursive and Explicit Sequences

3. Super Star Cinemas has some great new deals to draw in more customers.

Deal 1: Customers can purchase a Super Star Silver pass for \$25 and then they pay only \$3.99 for each movie.

Deal 2: Customers can purchase a Super Star Gold pass for \$47.50 and then pay \$1.49 per movie.

a. Fill in the table for the cost of each deal:

Deal 1	
# movies	cost
0	25
1	$25 + 3.99 = 28.99$
2	32.98
3	36.97
4	40.96
5	44.95

Deal 2	
# movies	cost
0	47.50
1	$47.50 + 1.49 = 48.99$
2	50.48
3	51.97
4	53.46
5	54.95

b. Write the recursive rule for each plan.

Deal 1

$$a_n = a_{n-1} + 3.99, a_0 = 25$$

Deal 2

$$a_n = a_{n-1} + 1.49, a_0 = 47.50$$

c. Write the explicit rule for each plan:

Deal 1

$$a_n = 3.99n + 25$$

Deal 2

$$a_n = 1.49n + 47.50$$

d. Find the cost of seeing 99 movies on Deal 1 AND Deal 2.

$$\begin{aligned} \text{Deal 1: } a_{99} &= 3.99(99) + 25 \\ &= \$420.01 \end{aligned}$$

$$\begin{aligned} \text{Deal 2: } a_{99} &= 1.49(99) + 47.50 \\ &= \$195.01 \end{aligned}$$

e. Find the number of movies you'd have to see in order to make the two deals have the same cost.

$$\begin{aligned} 3.99n + 25 &= 1.49n + 47.50 \\ -1.49n \quad -25 \quad -1.49n \quad -25 & \\ \hline 2.5n &= 22.5 \end{aligned}$$

$$2.5n = 22.5$$

$$\boxed{n=9} \quad 9 \text{ movies}$$