DO NOW

Paul has $680 in a savings account. He makes a deposit after he receives each paycheck. After one month he has $758 in the account. The next month the balance is $836. The balance after the third month is $914. How much will be in the account after 1 year?

Arithmetic

$a_1 = 758$

$a_2 = 836$

$a_3 = 914$

$d = 78$

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

$A_n = 758 + (n-1)78$

$A_{12} = 758 + (12-1)78$

$\boxed{A_{12} = \$1616}$

Feb 22-11:08 AM

Homework Answers

1) $A_n = -n + 16$

$A_{10} = 6$

2) $A_n = 2n + 28$

38 Seats

3) $A_0 = 1000$

$A_1 = 1205$

$A_n = 205n + 1000$

23 months

4) $A_1 = 300$

$A_n = 300(0.5)^{n-1}$

4.6875 mg 5 mg

5) $A_0 = 200$

$A_1 = 400$

$A_n = 400(2)^{n-1}$

1600 bacteria

6) $A_n = 12.75(0.85)^{n-1}$

9.2 feet

7) $A_n = 50{,}000(1.02)^{n-1}$

$53060.40

Jan 26-1:53 PM

Recursive Sequence Formulas

Recursive formula is written with **two parts**:

1) first term (a_1)

2) formula relating successive terms.

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Arithmetic Sequences - Recursive Form

Recursive Formulas

Subscript notation:

$a_1 = \#;\ \ a_n = a_{n-1} + d$

Function notation:

$f(1) = \#;\ f(n) = f(n - 1) + d$

$a_1 = f(1)$ = the value of the 1st term

$a_{n-1} = f(n-1)$ = the value of the previous term

d = common difference

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Geometric Sequences - Recursive Form

Subscript notation

a_1 = first term ; $a_n = r \bullet a_{n-1}$

Function notation

$f(1)$ = first term ; $f(n) = r \bullet f(n-1)$

$a_1 = f(1)$ = the value of the 1st term

$a_{n-1} = f(n-1)$ = the value of the previous term

r = common ratio

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Example 1: Using the recursive formula. Write the first four terms of each sequence:

value of the previous term

d-value

a) $f(1) = 2$ and $f(n) = \boxed{f(n-1)}\boxed{+10}$

$f(1)=2$
$f(2)=12$
$f(3)=22$
$f(4)=32$

$f(2)=2+10$
$f(2)=12$
$f(3)=12+10$
$f(3)=22$

$f(4)=22+10$
$f(4)=32$

b) $a_1 = 1$ and $a_n = 2\boxed{a_{n-1}} + 1$

$a_1=1$
$a_2=3$
$a_3=7$
$a_4=15$

$a_2=2(1)+1$
$a_2=3$

$a_3=2(3)+1$
$a_3=7$

$a_4=2(7)+1$
$a_4=15$

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Example 2: Using the recursive formula. Write the first four terms of the sequence:

$$A_n = a_{n-1} \bullet 5$$
$$a_1 = 2$$

$a_2 = 2 \cdot 5$

$a_2 = \boxed{10}$

$a_3 = 10 \cdot 5$

$a_3 = \boxed{50}$

$a_4 = 50 \cdot 5$

$a_4 = 250$

$a_1 = 2$

$a_2 = 10$

$a_3 = 50$

$a_4 = 250$

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Example 3: Find the fourth term in the sequence:

$$f(1) = -3$$
$$f(n) = \frac{1}{3} f(n-1) - 4$$

$f(2) = \frac{1}{3}(-3) - 4$

$f(2) = (-1) - 4$

$f(2) = -5$

$f(3) = \frac{1}{3}(-5) - 4$

$f(3) = \frac{-5}{3} - 4$

$f(3) = \frac{-17}{3}$

$f(4) = \frac{1}{3}\left(\frac{-17}{3}\right) - 4$

$f(4) = \frac{-17}{9} - 4$

9

$f(4) = \frac{-53}{9}$

$f(1) = -3$

$f(2) = -5$

$f(3) = \frac{-17}{3}$

$\boxed{f(4) = \frac{-53}{9}}$

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