

Arithmetic Sequence Applications

Write the first 5 terms of each sequence. Then, write both a recursive and an explicit formula for the sequence.

1. A cane of bamboo is $\overset{a_1}{30}$ in tall the first week and grows $\overset{d}{6}$ in per week thereafter.

$$a_n = 30 + (n-1)6$$

30, 36, 42, 48, 54

E: $a_n = 6n + 24$

R: $a_n = a_{n-1} + 6$
 $a_1 = 30$

2. You borrow $\overset{a_1}{\$350}$ from a friend the first week and $\overset{d}{\$25}$ pay the friend back each week thereafter.

$$a_n = 350 + (n-1)(-25)$$

350, 325, 300, 275, 250

E: $a_n = -25n + 375$

R: $a_n = a_{n-1} - 25$
 $a_1 = 350$

How many weeks to payback your friend? ($a_n = 0$)
 $0 = -25n + 375$
 $-375 = -25n$
n = 15 weeks

3. Find the value of a_1 and d . Given that $a_3 = 12$ and $a_9 = 36$.

$$12 = a_1 + (3-1)d$$

$$36 = a_1 + (9-1)d$$

$$12 = a_1 + 2d$$

$$36 = a_1 + 8d$$

* 2 unknowns
Systems

$$\begin{array}{r} 12 = a_1 + 2d \\ - 36 = a_1 + 8d \\ \hline \end{array}$$

$$\frac{-24}{-6} = \frac{-6d}{-6}$$

$$4 = d$$

$$12 = a_1 + 8$$

$$4 = a_1$$

$$36 = a_1 + 32$$

$$4 = a_1$$

$$a_1 = \underline{4}$$

$$d = \underline{4}$$

Check:

$\frac{4}{1}$ $\frac{8}{3}$ $\frac{12}{3}$ $\frac{16}{3}$ $\frac{20}{3}$ $\frac{24}{3}$ $\frac{28}{3}$ $\frac{32}{3}$ $\frac{36}{3}$ $\frac{40}{3}$