NAME: ______________________ PERIOD: ____________ DATE: ____________

Homework Problem Set

For Problems 1–4, list the first five terms of each sequence, and identify them as arithmetic or geometric.

1. $A(n) = A(n-1) + 4$ for $n \geq 1$ and $A(1) = -2$

$-2, 2, 6, 10, 14$

Arithmetic

2. $A(n) = \frac{1}{4} \cdot A(n-1)$ for $n \geq 1$ and $A(1) = 8$

$8, 2, \frac{1}{2}, \frac{1}{8}, \frac{1}{32}$

Geometric

3. $A(n) = A(n-1) - 19$ for $n \geq 1$ and $A(1) = -6$

$-6, -25, -44, -63, -82$

Arithmetic

4. $A(n) = \frac{2}{3}A(n-1)$ for $n \geq 1$ and $A(1) = 6$

$6, 4, \frac{8}{3}, \frac{16}{9}, \frac{32}{27}$

Geometric

For Problems 5–8, identify the sequence as arithmetic or geometric, and write a recursive formula for the sequence. Be sure to identify your starting value.

5. 14, 21, 28, 35, . . .

+7 Arithmetic

$f(n) = f(n-1) + 7$
$f(1) = 14$ for $n \geq 2$

or

$f(n+1) = f(n) + 7$
$f(1) = 14$, $n \geq 1$

6. 4, 40, 400, 4000, . . .

$\times 10$ Geometric

$f(n) = 10 f(n-1)$
$f(1) = 4$ for $n \geq 2$

$f(n+1) = 10 f(n)$
$f(1) = 4$, $n \geq 1$

7. 49, 7, 1, $\frac{1}{7}$, $\frac{1}{49}$, . . .

$\times \frac{1}{7}$ Geometric

$f(n) = \frac{1}{7} f(n-1)$
$f(1) = 49$ $n \geq 2$

$f(n+1) = \frac{1}{7} f(n)$
$f(1) = 49$, $n \geq 1$

8. −101, −91, −81, −71, . . .

+10 Arithmetic

$f(n) = f(n-1) + 10$
$f(1) = -101$ $n \geq 2$

$f(n+1) = f(n) + 10$
$f(1) = -101$, $n \geq 1$

9. The local football team won the championship several years ago, and since then, ticket prices have been increasing $20 per year. The year they won the championship, tickets were $50. Write a recursive formula for a sequence that models ticket prices. Is the sequence arithmetic or geometric?

+20 Arithmetic

50, 70, 90, . . .

$d = 20$
$f(1) = 50$

$f(n+1) = f(n) + 20$
for $n \geq 1$

10. A radioactive substance decreases in the amount of grams by one-third each year. If the starting amount of the substance in a rock is 1,452 g, write a recursive formula for a sequence that models the amount of the substance left after the end of each year. Is the sequence arithmetic or geometric?

$\frac{1}{3}$ decreased $\rightarrow$ $\frac{2}{3}$ amount remaining

$f(1)=1452$ $r=\frac{2}{3}$ Geometric

$f(n+1)=\frac{2}{3}f(n)$

$f(1)=1452$ $n \geq 1$

11. After knee surgery, your trainer tells you to return to your jogging program slowly. He suggests jogging for 12 minutes each day for the first week. Each week thereafter, he suggests that you increase that time by 6 minutes per day. How many weeks will it be before you are up to jogging 60 minutes per day?

BEST TO USE Explicit Formula.

$f(n)=12+6(n-1)$

$=12+6n-6$

$\boxed{f(n)=6n+6}$

$60=6n+6$

$54=6n$

$\boxed{9=n}$

at 9 weeks it'll be 60min/day

12. Brian gets a starting wage of $15 and an annual raise of $1.50 per hour. What will Brian's hourly wage be during his tenth year?

$f(n)=15+1.5(n-1)$

$=15+1.5n-1.5$

$\boxed{f(n)=1.5n+13.5}$

$f(10)=1.5(10)+13.5$

$=15+13.5$

$\boxed{=\$28.50}$

to diminish in value each year

$f(1)=30{,}000 \quad r=.7$

13. A car depreciates 30% every year. Find the value of a 5 year old car if the original price was $30,000.

$100\% - 30\% = 70\%$ value remains

$f(n) = 30{,}000(.7)^{n-1}$

$f(5) = 30{,}000(.7)^4$

$\boxed{f(5) = \$7{,}203}$

14. Scott is saving to buy a guitar. In the first week, he put aside $42 that he received for his birthday, and in each of the following weeks, he added $8 to his savings. He needs $400 for the guitar that he wants. In which week will he have enough money for the guitar?

$d=8$
$f(1)=42$

$f(n) = 42 + 8(n-1)$
$= 42 + 8n - 8$
$\boxed{f(n) = 8n + 34}$

$400 = 8n + 34$
$366 = 8n$
$\boxed{n = 45.75}$

* In 46 weeks he will have enough $ for guitar.

15. A virus reproduces by dividing into two, and after a certain growth period, it divides in two again. How many viruses will be in a system starting with a single virus after 10 divisions?

$f(1) = 1$
$r = 2$

$f(n) = 1(2)^{n-1}$

$f(11) = (2)^{11-1}$
$f(11) = (2)^{10}$
$\boxed{= 1{,}024}$

1, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024

10^{th} division $\longrightarrow$ 11 terms