LESSON 147

1. Each year the balance increases by $5000(0.04) = \$20$. The balance at the end of the first year is \$5,200.

$5200, 5400, 5600, 5800, 6000, \ldots$

$a_1 = 5200$ and $d = 200$, so $a_n = 200n + 5000$.

$a_{10} = 200(10) + 5000 = 7000$

The balance will be \$7,000.

2. Each height is 0.75 times the prior one. The height after the first bounce is $128(0.75) = 96$ feet.

$96, 96(0.75), 96(0.75)^2, 96(0.75)^3, \ldots$

$a_1 = 96$ and $r = 0.75$, so $a_n = 96(0.75)^{n-1}$.

$a_7 = 96(0.75)^6 = 17.08 \ldots$

The ball will rebound to about 17 feet.

3. $20, 23, 26, 29, \ldots$

$a_1 = 20$ and $d = 3$, so $a_n = 3n + 17$.

$a_{24} = 3(24) + 17 = 89$

$$S_{24} = \frac{24}{2}(20 + 89) = 1308$$

There are 1,308 seat.

4. Each year's salary is 1.04 times the prior year's salary. The salary in the first year is \$62000.

$62000, 62000(1.04), 62000(1.04)^2, \ldots$

$a_1 = 62000$ and $r = 1.04$.

$$S_6 = 62000\left(\frac{1 - 1.04^6}{1 - 1.04}\right) = 411244.47866 \ldots$$

Mark earned about \$411,244 in total.

5. Each year the balance increases by $1000(0.05) = \$50$. The balance at the end of the first year is \$1,050.

$1050, 1100, 1150, 1200, 1250, \ldots$

$a_1 = 1050$ and $d = 50$, so $a_n = 50n + 1000$.

$a_{15} = 50(15) + 1000 = 1750$.

The balance will be \$1,750.

6. Each year the height increases by 1.2 feet. The height at the beginning of the first year was 5 ft.

$5, 6.2, 7.4, 8.6, 9.8, \ldots$

$a_1 = 5$ and $d = 1.2$, so $a_n = 1.2n + 3.8$.

$a_8 = 1.2(8) + 3.8 = 13.4$

The tree will be about 13 feet tall.

7. $72, 76, 80, 84, 88, \ldots$

$a_1 = 72$ and $d = 4$, so $a_n = 4n + 68$.

$a_7 = 4(7) + 68 = 96$

Her score will be 96% on his seventh quiz.

8. Each year's value is 0.9 times the prior year's value. The value after the first year is $20000(0.9) = \$18000$.

$18000, 18000(0.9), 18000(0.9)^2, \ldots$

$a_1 = 18000$ and $r = 0.9$, so $a_n = 18000(0.9)^{n-1}$.

$a_6 = 18000(0.9)^5 = 10628.82$

The value of the car will be about \$10,629.

9. A 100% increase means the quantity doubles. Each week the site will have 2 times the prior week's hits. In the first week, the site had 500 hits.

$500, 500(2), 500(2)^2, 500(2)^3, \ldots$

$a_1 = 500$ and $r = 2$, so $a_n = 500(2)^{n-1}$.

$a_5 = 500(2)^4 = 8000$

The site will have 8,000 hits.

10. $10, 10(2), 10(2)^2, 10(2)^3, \ldots$

$a_1 = 10$ and $r = 2$, so $a_n = 10(2)^{n-1}$.

$a_8 = 10(2)^7 = 1280$

There will be 1,280 bacteria.

11. $55000, 57500, 60000, 62500, \ldots$

$a_1 = 55000$ and $d = 2500$, so $a_n = 2500n + 52500$.

$a_{12} = 2500(12) + 52500 = 82500$

$$S_{12} = \frac{12}{2}(55000 + 82500) = 825000$$

Eva earned \$825,000 in total.

12. $2, 2.5, 3, 3.5, 4, 4.5, \ldots$

$a_1 = 2$ and $d = 0.5$, so $a_n = 0.5n + 1.5$.

$a_{30} = 0.5(30) + 1.5 = 16.5$

$$S_{30} = \frac{30}{2}(2 + 16.5) = 277.5$$

The total distance is about 278 miles.

13. $a_1 = 300$ and $r = 0.5$.

$$S_8 = 300\left(\frac{1 - 0.5^8}{1 - 0.5}\right) = 597.65625$$

Shylo took about 598 mg in total.

14. Each week's sales are 0.9 times the prior week's sales.

$a_1 = 2000$ and $r = 0.9$.

$$S_{10} = 2000\left(\frac{1 - 0.9^{10}}{1 - 0.9}\right) = 13026.43119 \ldots$$

About a total of 13,026 copies are sold.