

$$(3+6) + (4+6) + (5+6) + (6+6)$$

$$7+8+9+10$$

$$(0^2-3) + (1^2-3) + (2^2-3) + (3^2-3)$$

$$(4^2-3) + (5^2-3)$$

4.3 Applications of Sequences and Series

- Rosa was taught how to play kickball. She taught 2 of her friends to play kickball. Each of her 2 friends taught 2 additional friends. The pattern continued for 4 sets of lessons. Including Rosa, how many people were taught how to play kickball?

$$a_1 = 2 \quad r = 2 \quad n = 4 \quad S_n = \frac{a_1(1-r^n)}{1-r} \quad S_4 = \frac{2(1-2^4)}{1-2} = \boxed{30}$$

- A woman makes \$40,000 during the first year of her new job. Each year she receives a 5% raise. To the nearest dollar, what were her total earnings during her first 4 years on the job?

$$a_1 = 40,000 \quad r = 1.05 \quad n = 4 \quad S_4 = \frac{40,000(1-1.05^4)}{1-1.05} = \boxed{\$172,405}$$

- Jodie draws a sequence of circles. She starts with a row of 8 circles. The second row has 3 more circles than the first row, the third row has 3 more circles than the second row, and so on. How many circles are in the ninth row?

$$a_1 = 8 \quad d = 3 \quad a_n = a_1 + (n-1)d \quad a_9 = 8 + (8)(3) = \boxed{32}$$

- A piece of machinery valued at \$80,000 depreciates \$8000 the first year, \$7500 the second year, \$7000 the third year, and so on. What is the amount the machine has depreciated over six years?

$$a_1 = 8000 \quad d = -500 \quad n = 6 \quad a_6 = 8000 + (5)(-500) = 5500 \quad S_6 = \frac{6}{2}(8000 + 5500) = 3(8000 + 5500) = \boxed{\$40,500}$$

- The first year a toy manufacturer introduces a new toy, its sales total \$495,000. The company expects its sales to drop 10% each succeeding year. Find the total expected sales in the 6th year.

$$a_1 = 495,000 \quad r = 0.9 \quad a_6 = a_1(r)^5 \quad a_6 = 495,000(0.9)^5 = \boxed{\$292,292.55}$$

- A fifty row theater has 10 seats in the first row, 11 seats in the second row, 12 seats in the third row, and so on. How many seats are in the theater?

$$n = 50 \quad a_1 = 10 \quad d = 1 \quad S_{50} = \frac{50}{2}(10 + a_n) \quad a_{50} = 10 + (49)(1) = 59 \quad S_{50} = 25(10 + 59) = \boxed{1725}$$