Arithmetic Sequence Word Problem Notes

1.) The sum of the interior angles of a triangle is 180°, of a quadrilateral is 360° and of a pentagon is 540°. Assuming this pattern continues, find the sum of the interior angles of a dodecagon (12 sides).

Equation: $180(n-2)$ Answer: 1800

2.) 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~~ week. How many weeks will it be before you are up to jogging 60 minutes per day?

12, 18, 24, ...

a_1 $d = 6$

$60 = 12 + 6n - 6$

$60 = 6 + 6n$

$54 = 6n$

$9 = n$

← Equation: $60 = 12 + 6(n-1)$ Answer: 9

3.) A theater has 60 seats in the first row, 68 seats in the second row, 76 seats in the third row, and so on in the same increasing pattern. If the theater has 20 rows of seats, how many seats are in the 20th row of the theater?

60, 68, 76 (+8, +8)

$a_1 = 60$

$d = 8$

$a_{20} = 60 + 8(19)$

$a_{20} = 212$

← Equation: $a_{20} = 60 + 8(n-1)$ Answer: 212

4.) A display of cans on a grocery shelf consists of 20 cans on the bottom, 18 cans in the next row, and so on in an arithmetic sequence, until the top row has 4 cans. How many cans, in total, are in the display?

20, 18, 16, ... (−2)

$a_1 = 20$ $a_6 = 10$

$a_2 = 18$ $a_7 = 8$

$a_3 = 16$ $a_8 = 6$

$a_4 = 14$ $a_9 = 4$

$a_5 = 12$ [add them up]

← Equation: $a_n = 20 + -2(n-1)$ Answer: 108

5.) Which term of the arithmetic sequence -3, 2, 7, ... would give you 117?

$a_1 = -3$ $d = 5$

$a_n = -3 + 5(n-1)$

$117 = -3 + 5n - 5$

$117 = -8 + 5n$

$125 = 5n$

$25 = n$

←Equation: $117 = -3 + 5(n-1)$ Answer: 25

1.) Starting May 1, a new store will begin giving away 500 posters as a promotion. Each day, 4 posters will be given away. If the store is open 7 days a week, how many posters will the store have left when it opens for business on May 14?

Days of promotion	1	2	3	4
Posters remaining	500	496	492	488

$a_1 = 500$

$d = -4$

$a_{14} = 500 + -4(13)$ Equation: $a_{14} = 500 + -4(n-1)$ Answer: 448

2.) 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?(Hint: How many years has he worked when he starts out earning $15?)

$a_1 = 15$ $d = 1.50$

don't take off the first year here → Equation: $a_{10} = 15 + 10(1.5)$ Answer: $30

3.) A pile of bricks has 97 bricks in the first row, 91 bricks in the second row, 85 bricks in the third row, and so on until there is only one brick in the top row. How many bricks are in the 15th row?

$a_1 = 97$ $d = -6$

$a_{15} = 97 + -6(14)$ ← Equation: $a_{15} = 97 + -6(n-1)$ Answer: 13

4.) A projectile fired vertically upward rises 1,500 feet in the first second, 1,450 feet the following second, 1,400 feet the third second, and so on. How many feet does it rise in the 20th second?

$a_1 = 1500$ $d = -50$

$a_{20} = 1500 + -50(n-1)$

$a_{20} = 1500 + -50(20)$ [500 ft]

5.) An employee is offered a $30,000 starting salary with an annual raise of $800. If she is still there in year 10, what will her salary be? (Hint: How many years has she worked when she earns $30,000?)

$a_1 = 30,000$ $d = 800$

$a_{10} = 30000 + 10(800)$

$a_{10} = 38,000$