Arithmetic Sequence Assignment

1. Write the first five terms of each arithmetic sequence.

a) $a = 2, d = 3$

2, 5, 8, 11, 14

b) $a = 7, d = 4$

7, 11, 15, 19, 23

c) $a = -1, d = -3$

-1, -4, -7, -10, -13

d) $a = 12, d = -4$

12, 8, 4, 0, -4

e) $a = -8, d = 5$

-8, -3, 2, 7, 12

f) $a = 5, d = -8$

5, -3, -11, -19, -27

2. for the arithmetic sequence 3, 5, 7, 9, ..., determine each term.

a = 3

d = 2 2 2

a) t_n

$t_n = a + (n-1)d$

$t_n = 3 + (n-1)2$

$t_n = 3 + 2n - 2$

$\boxed{t_n = 2n + 1}$

b) t_6

$t_n = 2n + 1$

$t_6 = 2(6) + 1$

$= 12 + 1$

$\boxed{t_6 = 13}$

c) t_{25}

$t_{25} = 2n + 1$

$= 2(25) + 1$

$= 50 + 1$

$\boxed{t_{25} = 51}$

3. for the arithmetic sequence 11, 8, 5, 2, ..., determine each term.

d = -3

a) t_n

$t_n = a + (n-1)d$

$= 11 + (n-1)(-3)$

$= 11 - 3n + 3$

$t_n = 14 - 3n$

b) t_6

$t_6 = 14 - 3n$

$= 14 - 3(6)$

$= 14 - 18$

$t_6 = -4$

c) t_{20}

$t_{20} = 14 - 3n$

$= 14 - 3(20)$

$= 14 - 60$

$t_{20} = -46$

4. Write the general term for each arithmetic sequence.

a) i) 5, 8, 11, 14, ...

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

$= 5 + 3n - 3$

$\boxed{t_n = 2 + 3n}$

ii) 17, 14, 11, 8, ...

$t_n = 17 + (n-1)(-3)$

$= 17 - 3n + 3$

$\boxed{t_n = 20 - 3n}$

iii) 5, 7, 9, 11, ...

$t_n = 5 + (n-1)2$

$= 5 + 2n - 2$

$\boxed{t_n = 3 + 2n}$

iv) 10, 8, 6, 4, ...

$t_n = 10 + (n-1)(-2)$

$= 10 - 2n + 2$

$\boxed{t_n = 12 - 2n}$

b) Choose one sequence from part a. Write to explain how you determined the general term.

i) Determined $a = 5$ (first term) and $d = 3$ (common difference) then did arithmetic

5. Each sequence is an arithmetic sequence. Write a formula for t_n, then use it to determine the indicated term.

a) $1, 5, 9, 13, \ldots t_{17}$

$-2, -5, -8, -11, \ldots t_{10}$

$t_n = 1 + (n-1)4$

$t_{17} = 1 + (17-1)4$

$= 1 + (16)4$

$= 1 + 64 = \boxed{65}$

b) $3, 6, 9, 12, \ldots t_{21}$

$t_n = 3 + (n-1)3$

$= 3 + 3n - 3$

$t_n = 3n$

$t_{21} = 3(21)$

$\boxed{= 63}$

c) $-4, 1, 6, 11, \ldots t_{13}$

$t_n = -4 + (n-1)5$

$t_{13} = -4 + (13-1)5$

$= -4 + (12)5$

$= -4 + 60$

$\boxed{t_{13} = 56}$

d) $41, 35, 29, 23, \ldots t_{18}$

$t_n = 41 + (n-1)(-6)$

$= 41 - 6n + 6$

$t_n = 47 - 6n$

$t_{18} = 47 - 6(18)$

$= 47 - 108$

$\boxed{t_{18} = -61}$

e) $-2, -5, -8, -11 \ldots t_{10}$

$t_n = -2 + (n-1)(-3)$

$= -2 - 3n + 3$

$t_n = 1 - 3n$

$t_{10} = 1 - 3(10) = 1 - 30 = \boxed{-29}$

f) $9, 1, -7, -15, \ldots t_{46}$

$t_n = 9 + (n-1)(-8)$

$= 9 - 8n + 8$

$= 17 - 8n$

$t_{46} = 17 - 8(46)$

$\boxed{t_{46} = -351}$

6. A pile of bricks is arranged in rows. The number of bricks in each row forms the arithmetic sequence 65, 59, 53, ... $d = -6$

a) One row contains 17 bricks. Which row is this?

$t_n = a + (n-1)d$

$17 = 65 + (n-1)(-6)$

$17 = 65 - 6n + 6$

$17 = 71 - 6n$

$-71 \quad -71$

$\frac{-54}{-6} = \frac{-6n}{-6}$

$9 = n$

$\therefore$ 9th row has 17 bricks

b) How many rows of bricks are there? Explain your assumptions and answer.

assume last row has minimum 1 brick

$t_n = a + (n-1)d$

$1 = 65 + (n-1)-6$

$1 = 65 - 6n + 6$

$1 = 71 - 6n$

$1 = 71 - 6n$

$-71 \quad -71$

$\frac{-70}{-6} = \frac{-6n}{-6}$

$11.7 = n$

$\therefore$ 11 rows has 5 bricks

$t_{11} = 65 + (11-1)(-6)$

$= 65 + 10(-6)$

$= 65 - 60$

$t_{11} = 5$

7. An arithmetic sequence is 8, 14, 20, 26, ... Which term is 92?

$t_n = a + (n-1)d \quad d = +6$

$92 = 8 + (n-1)6$

$92 = 8 + 6n - 6$

$92 = 2 + 6n$

$-2 \quad -2$

$\frac{90}{6} = \frac{6n}{6}$

$15 = n$

The 15th term is 92

8. a) For each arithmetic sequence, a later term in the sequence is given. Which term is it?

i) 5, 8, 11, ..., 41

$41 = 5 + (n-1)3$

$41 = 5 + 3n - 3$

$41 = 2 + 3n$

$-2 \quad -2$

$\frac{39}{3} = \frac{3n}{3}$

$13 = n$

ii) 2, 7, 12, ..., 122

$122 = 2 + (n-1)5$

$122 = 2 + 5n - 5$

$122 = 5n - 3$

$+3 \quad +3$

$\frac{125}{5} = \frac{5n}{5}$

$n = 25$

iii) 14, 25, 36, ..., 234

$+11 \quad +11$

$234 = 14 + (n-1)11$

$234 = 14 + 11n - 11$

$234 = 3 + 11n$

$-3 \quad -3$

$231 = 11n$

$21 = n$

iv) 75, 68, 61, ..., 12

$12 = 75 + (n-1)(-7)$

$12 = 75 - 7n + 7$

$12 = 82 - 7n$

$-82 \quad -82$

$\frac{-70}{-7} = \frac{-7n}{-7}$

$10 = n$

v) $-12, -6, 0, ..., 72$

$72 = -12 + (n-1)6$

$72 = -12 + 6n - 6$

$72 = -18 + 6n$

$+18 \quad +18$

$\frac{90}{6} = \frac{6n}{6}$

$15 = n$

vi) 28, 20, 12, ..., −164

$-164 = 28 + (n-1)(-8)$

$-164 = 28 - 8n + 8$

$-164 = 36 - 8n$

$-36 \quad -36$

$-200 = -8n$

$25 = n$

b) Choose one sequence from part a. Write to explain how you identified the term.

i) Identify last term ($41 = t_n$), identify common difference ($d = 3$) identify first term ($a = 5$) → calculate.

9. The Olympic Winter Games are held every four years. The first Winter Olympics were held in 1924.

a) Beginning with 1924, list what should have been the first six Winter Olympic years.

1924 1928 1932 1936 1940 1944

+4 +4 +4 +4 +4

b) In two of those years, the Winter Olympics were cancelled. What years do you think they were? Explain your answer.

1940 and 1944 because of World War II.

c) The Winter Olympics followed the pattern of being held every four years until 1992. Beginning in 1994, another pattern of holding the Winter Olympics every four years was begun. How many Winter Olympics followed the first pattern?

$t_n = a + (n-1)d$

$1992 = 1924 + (n-1)4$

$1992 = 1924 + 4n - 4$

$1992 = 1920 + 4n$

$\frac{72}{4} = \frac{4n}{4}$

$18 = n$

$18 - 2$

$= 16$ winter olympics followed this pattern

d) Why do you think the first pattern was broken in 1994?

Athletes could compete/train for both winter and summer games in alternating 2 year cycles.