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) t_n

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

b) t_6

$t_6 = 3 + (6-1)(2)$
$= 3 + 5(2)$
$= 13$

c) t_{25}

$t_{25} = 3 + (25-1)(2)$
$= 3 + 24(2)$
$= 51$

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

a) t_n

$t_n = 11 + (n-1)(-3)$
$= 11 + 3n + 3$
$= 14 - 3n$

b) t_6

$t_6 = 11 + (6-1)(-3)$
$= 11 + 5(-3)$
$= 11 - 15$
$= -4$

c) t_{20}

$t_{20} = 11 + (20-1)(-3)$
$= 11 + 19(-3)$
$= -46$

4. Write the general term for each arithmetic sequence.

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

$t_n = 5 + (n-1)3$
$= 3n + 2$

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

$t_n = 17 + (n-1)(-3)$
$= 20 - 3n$

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

$t_n = 5 + (n-1)(2)$
$= 2n + 3$

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

$t_n = 10 + (n-1)(-2)$
$= 12 - 2n$

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

Determine a and d, then substitute them into the equation $t_n = a + (n-1)d$.

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

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

$t_n = 1 + (n-1)4$
$= 4n - 3$
$t_{17} = 4(17) - 3 = 65$

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

$t_n = 3 + (n-1)3$
$= 3n$
$t_{21} = 3(21)$
$= 63$

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

$t_n = -4 + (n-1)5$
$= 5n - 9$
$t_{13} = 5(13) - 9 = 56$

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

$t_n = 41 + (n-1)(-6)$
$= -6n + 47$
$t_{18} = -6(18) + 47$
$= -61$

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

$t_n = -2 + (n-1)(-3)$
$= -3n + 1$
$t_{10} = -3(10) + 1 = -29$

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

$t_n = 9 + (n-1)(-8)$
$= -8n + 17$
$t_{46} = -8(46) + 17$
$= -351$

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

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

$t_n = 17, n = ?$ $17 = 65 + (n-1)(-6)$
$a = 65$ $-48 = -6(n-1)$
$d = -6$ $8 = n-1$
                      $n = 9$ 9th row

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

$t_n = 0? \ n = ?$ $0 = 65 + (n-1)(-6)$
$a = 65$ $-65 = -6(n-1)$
$d = -6$ $n = 11.8$ 11 rows

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

$t_n = 92, n = ?$ $92 = 8 + (n-1)6$
$a = 8$ $84 = 6(n-1)$
$d = 6$ $14 = n-1$
                    $n = 15$ 15th term

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

   i) 5, 8, 11, ..., 41
   $41 = 5 + (n-1)3$
   $36 = 3(n-1)$
   $12 = n-1$
   $n = 13$

   ii) 2, 7, 12, ..., 122
   $122 = 2 + (n-1)5$
   $120 = 5(n-1)$
   $24 = n-1$
   $n = 25$

   iii) 14, 25, 36, ..., 234
   $234 = 14 + (n-1)11$
   $220 = 11(n-1)$
   $20 = n-1$
   $n = 21$

   iv) 75, 68, 61, ..., 12
   $12 = 75 + (n-1)(-7)$
   $-63 = -7(n-1)$
   $9 = n-1$
   $n = 10$

   v) −12, −6, 0, ..., 72
   $72 = -12 + (n-1)6$
   $84 = 6(n-1)$
   $14 = n-1$
   $n = 15$

   vi) 28, 20, 12, ..., −164
   $-164 = 28 + (n-1)(-8)$
   $-192 = -8(n-1)$
   $24 = n-1$
   $n = 25$

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

i) Determined $t_n = 41$, $a = 5$ and $d = 3$.
  Substitute values into general equation
  and then solve for n.

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

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

1940 and 1944
This is when WWII was.

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?

$t_n = 1992$ $1992 = 1924 + (n-1)4$
$a = 1924$ $68 = 4(n-1)$
$d = +4$ $17 = n-1$
                 $n = 18$
                 subtract 2 for 1940/44

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

To separate the Summer and
Winter Olympics

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