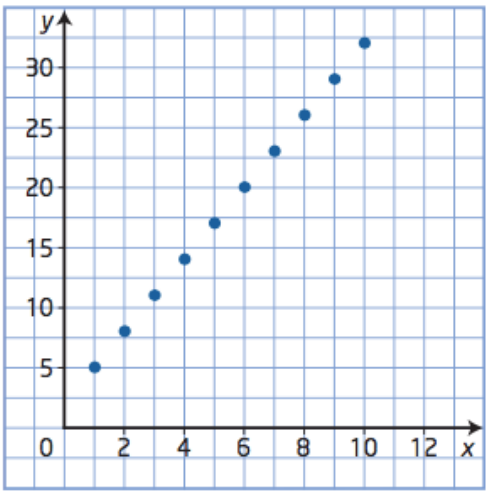
Date _____ Name _____

Arithmetic Sequences SECTION 1

Practise

1. Identify the arithmetic sequences from the following sequences. For each arithmetic sequence, state the value of t_1, the value of d, and the next three terms.
   a) 16, 32, 48, 64, 80, ...
   b) 2, 4, 8, 16, 32, ...
   c) $-4, -7, -10, -13, -16, \ldots$
   d) $3, 0, -3, -6, -9, \ldots$
2. Write the first four terms of each arithmetic sequence for the given values of t_1 and d.
   a) $t_1 = 5, d = 3$
   b) $t_1 = -1, d = -4$
   c) $t_1 = 4, d = \frac{1}{5}$
   d) $t_1 = 1.25, d = -0.25$
3. For the sequence defined by $t_n = 3n + 8$, find each indicated term.
   a) t_1 b) t_7 c) t_{14}
4. For each arithmetic sequence determine the values of t_1 and d. State the missing terms of the sequence.
   a) ■, ■, ■, 19, 23
   b) ■, ■, 3, $\frac{3}{2}$
   c) ■, 4, ■, ■, 10
5. Determine the position of the given term to complete the following statements.
   a) 170 is the ■th term of $-4, 2, 8, \ldots$
   b) -14 is the ■th term of $2\frac{1}{5}, 2, 1\frac{4}{5}, \ldots$
   c) 97 is the ■th term of $-3, 1, 5, \ldots$
   d) -10 is the ■th term of 14, 12.5, 11, ...
6. Determine the second and third terms of an arithmetic sequence if
   a) the first term is 6 and the fourth term is 33
   b) the first term is 8 and the fourth term is 41
   c) the first term is 42 and the fourth term is 27

7. The graph of an arithmetic sequence is shown.



a) What are the first five terms of the sequence?

b) Write the general term of this sequence.

c) What is t_{50}? t_{200}?

13. Each square in this pattern has a side length of 1 unit. Assume the pattern continues.

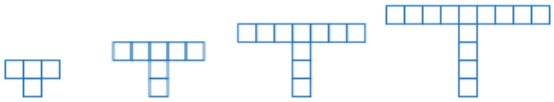


Figure 1 Figure 2 Figure 3 Figure 4

a) Write an equation in which the perimeter is a function of the figure number.

b) Determine the perimeter of Figure 9.

c) Which figure has a perimeter of 76 units?

Apply

8. Which arithmetic sequence(s) contain the term 34? Justify your conclusions.

A $t_n = 6 + (n - 1)4$

B $t_n = 3n - 1$

C $t_1 = 12, d = 5.5$

D 3, 7, 11, ...

9. Determine the first term of the arithmetic sequence in which the 16th term is 110 and the common difference is 7.

10. The first term of an arithmetic sequence is $5y$ and the common difference is $-3y$. Write the equations for t_n and t_{15}.

11. The terms $5x + 2$, $7x - 4$, and $10x + 6$ are consecutive terms of an arithmetic sequence. Determine the value of x and state the three terms.

Arithmetic Series SECTION 2

Practise

1. Determine the sum of each arithmetic series.
   a) $5 + 8 + 11 + \cdots + 53$
   b) $7 + 14 + 21 + \cdots + 98$
   c) $8 + 3 + (-2) + \cdots + (-102)$
   d) $\frac{2}{3} + \frac{5}{3} + \frac{8}{3} + \cdots + \frac{41}{3}$
2. For each of the following arithmetic series, determine the values of t_1 and d, and the value of S_n to the indicated sum.
   a) $1 + 3 + 5 + \cdots (S_8)$
   b) $40 + 35 + 30 + \cdots (S_{11})$
   c) $\frac{1}{2} + \frac{3}{2} + \frac{5}{2} + \cdots (S_7)$
   d) $(-3.5) + (-1.25) + 1 + \cdots (S_6)$
3. Determine the sum, S_n, for each arithmetic sequence described.
   a) $t_1 = 7, t_n = 79, n = 8$
   b) $t_1 = 58, t_n = -7, n = 26$
   c) $t_1 = -12, t_n = 51, n = 10$
   d) $t_1 = 12, d = 8, n = 9$
   e) $t_1 = 42, d = -5, n = 14$
4. Determine the value of the first term, t_1, for each arithmetic series described.
   a) $d = 6, S_n = 574, n = 14$
   b) $d = -6, S_n = 32, n = 13$
   c) $d = 0.5, S_n = 218.5, n = 23$
   d) $d = -3, S_n = 279, n = 18$
5. For the arithmetic series, determine the value of n.
   a) $t_1 = 8, t_n = 68, S_n = 608$
   b) $t_1 = -6, t_n = 21, S_n = 75$
6. For each series find t_{10} and S_{10}.
   a) $5 + 10 + 15 + \cdots$
   b) $10 + 7 + 4 + \cdots$
   c) $(-10) + (-14) + (-18) + \cdots$
   d) $2.5 + 3 + 3.5 + \cdots$

Apply

7. a) Determine the sum of all the multiples of 4 between 1 and 999.
   b) What is the sum of the multiples of 6 between 6 and 999?

9. A training program requires a pilot to fly circuits of an airfield. Each day, the pilot flies three more circuits than the previous day. On the fifth day, the pilot flew 14 circuits. How many circuits did the pilot fly

a) on the first day?

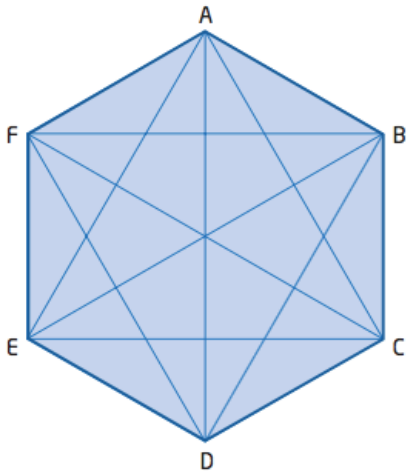
b) in total by the end of the fifth day?

c) in total by the end of the *n*th day?

10. The second and fifth terms of an arithmetic series are 40 and 121, respectively. Determine the sum of the first 25 terms of the series.

11. The sum of the first five terms of an arithmetic series is 85. The sum of the first six terms is 123. What are the first four terms of the series?

14. The number of handshakes between 6 people where everyone shakes hands with everyone else only once may be modelled using a hexagon. If you join each of the 6 vertices in the hexagon to every other point in the hexagon, there are $1 + 2 + 3 + 4 + 5$ lines. Therefore, there are 15 lines.



a) What does the series $1 + 2 + 3 + 4 + 5$ represent?

b) Write the series if there are 10 people in the room and everyone shakes hands with everyone else in the room once.

c) How many handshakes occur in a room of 30 people?