Name: ____ Date: ____________________________

BLM 1–1

Chapter 1 Self-Assessment

Concept	BEFORE	DURING (What I can do)	AFTER (Proof that I can do this)
1.1			
I can write a formula to determine the general term of an arithmetic sequence.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
I can generate a sequence that represents a particular situation.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
I can provide an example of an arithmetic sequence.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
I can justify an example of an arithmetic sequence.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
I can derive a rule for determining the general term of an arithmetic sequence.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
I can determine t_1, d, n, or t_n in a problem that involves an arithmetic sequence.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
I can describe the relationship between an arithmetic sequence and a linear function.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
I can solve a problem that involves an arithmetic sequence.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes

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BLM 1–1
(continued)

Concept	BEFORE	DURING (What I can do)	AFTER (Proof that I can do this)
1.2			
I can determine the sum of an arithmetic series.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
I can derive a rule for determining the sum of n terms of an arithmetic series.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
I can determine t_1, d, n, or S_n in an arithmetic series.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
I can solve a problem that involves an arithmetic series.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
1.3			
I can provide an example of a geometric sequence.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
I can justify an example of a geometric sequence.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
I can determine the values of t_1, r, or t_n in a problem that involves a geometric sequence.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
I can derive a rule for determining the general term of a geometric sequence.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
I can solve a problem that involves a geometric sequence.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes

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BLM 1–1
(continued)

Concept	BEFORE	DURING (What I can do)	AFTER (Proof that I can do this)
1.4			
I can derive a rule for determining the sum of n terms of a geometric series.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
I can determine t_1, r, n, and S_n in a geometric sequence.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
I can solve a problem that involves a geometric series.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
I can identify any assumptions made when identifying a geometric series.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
I can solve a finance problem using a geometric series.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
1.5			
I can write a repeating decimal as the sum of an infinite geometric series.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
I can generalize a rule for determining the sum of an infinite geometric series.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
I can explain why a geometric series is convergent.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes
I can explain why a geometric series is divergent.	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes	❑ No, not yet ❑ Some ❑ Yes

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BLM 1–2

Chapter 1 Prerequisite Skills

1. Determine whether each relation is linear or non-linear. Justify each answer.

a) $A = \pi r^2$

b) $y = 5x - 3$

c) (0, 0), (1, 1), (4, 2), (9, 3), (16, 4)

d) (2, 5), (4, 10), (6, 15), (8, 20), (10, 25)

2. Christina writes the following number pattern: 9, 16, 23, … .

a) Create a table of values for the first five terms.

b) Develop an equation that can be used to determine the value of each term in the number pattern.

c) What is the value of the 71st term?

d) Which term has a value of 135?

3. Julian creates a number pattern that starts with the number –4. Each subsequent term is 5 less than the previous term.

a) Create a table of values for the first five numbers in the pattern.

b) What equation can be used to represent the pattern? Verify your answer by substituting a known value into your equation.

c) What is the value of the 49th term?

d) Which term has a value of –89?

4. Create a graph and a linear equation to represent each table of values.

a)

x	y
–3	–8
–2	–5
–1	–2
0	1
1	4
2	7
3	10

b)

x	y
12	2
15	3
18	4
21	5
24	6
27	7
30	8

5. Express each equation in slope-intercept form.

a) $2x + y = 6$

b) $3x + y + 9 = 0$

c) $5x + 6y = 8$

d) $6x - y = 4$

e) $7x - y + 9 = 0$

f) $8x - 4y = 3$

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BLM 1–2
(continued)

6. What is the value of each expression?

a) 5^3

b) $(-6)^4$

c) $\left(\frac{1}{2}\right)^4$

d) $\left(-\frac{2}{3}\right)^2$

7. Evaluate.

a) $\sqrt[3]{-8}$

b) $\sqrt[4]{81}$

c) $\sqrt{\left(\frac{1}{9}\right)}$

d) $\sqrt[5]{\left(-\frac{32}{243}\right)}$

8. Simplify each expression by rewriting it using positive exponents only.

a) $\frac{12^3}{12^7}$

b) $\frac{1}{s^2t^{-3}}$

c) $\frac{8t}{t^{-3}}$

d) $\left[\left(xy^5\right)^{-3}\right]^{-2}$

9. Protactinium has a half-life of 2 min. Suppose a sample of protactinium has a mass of 1000 g. The formula for the mass of protactinium remaining after n 2-min intervals is $A = 1000\left(\frac{1}{2}\right)^n$.

a) Create a table of values showing the amount of protactinium remaining after the first five 2-min intervals.

b) How long would it take for the sample to be reduced to $\frac{1}{64}$ th its original size?

Chapter 1 Warm-Up

Section 1.1 Warm-Up

1. Describe the pattern demonstrated by each of the following.

a) 2, 4, 6, 8, …

b) 1, 4, 7, 10, …

c) 5, 11, 17, …

2. Solve for x.

a) $35 = 3x - 4$

b) $64 = -2(x - 3)$

3. If $g(n) = 6n - 11$, determine

a) $g(1)$

b) $g(0)$

c) $g(-3)$

4. For each system of linear equations, use elimination or addition to solve for x.

a) $22 = 2x - y$
$12 + 2x = 3y$

b) $7 = \frac{1}{2}x + \frac{1}{2}y$
$-10 - x = 2y$

5. Consider the equation $y = 4x - 1$.

a) Determine the slope and y-intercept of the line.

b) Create a table of values for values of x from 0 to 5.

Section 1.2 Warm-Up

1. Identify whether each of the following is an arithmetic sequence. If so, state the values of t_1 and d.

a) 2, 4, 6, …

b) –5, 10, –20 …

c) 1, 4, 7, …

d) –6, –1, 4, …

2. For $t_n = t_1 + (n - 1)d$,

a) explain the meaning of t_n, t_1, n, and d

b) determine t_{26} for 3, 6, 9, …

c) determine t_1 if $t_{30} = 82$ and $d = 3$

d) write the general form for 2, 6, 10, …

3. Simplify each equation.

a) $y = 2[3(x - 1) + 3]$

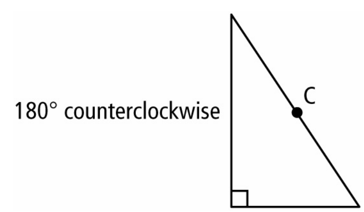
b) $y = \frac{1}{2}[4(x + 2) - 6]$

c) $y = \frac{2}{3}(27 + 54x)$

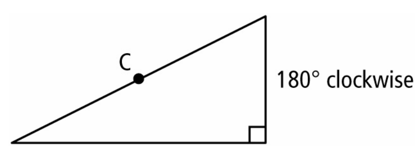
4. Solve the following linear system for x and y.
$2y - 3x = 5$ and $3y = -5x + 1$

5. Copy each diagram into your notebook and sketch the resulting rotations about the point C.

a)



b)



Section 1.3 Warm-Up

1. Determine whether each pattern represents an arithmetic sequence. If it does, state the value of t_1 and d. If it does not represent an arithmetic sequence, explain why.

a) 2, 4, 6, …

b) 2, 4, 8, …

c) 5, 3, 1, …

d) –4, –2, –1, …

2. For the arithmetic sequence –6, –3, 0, …,

a) what is the general term t_n?

b) determine S_{10}.

3. A 20 cm × 16 cm photograph of a company logo is being used for advertisements. Determine the new dimensions if the photograph needs to be

a) enlarged 240% to create a poster.

b) reduced by 25% to fit in a book.

4. Use technology to determine each value to the nearest hundredth.

a) $\sqrt[3]{45}$

b) $\sqrt[7]{16}$

c) $\sqrt[25]{28\ 712}$

d) $\sqrt[3]{125} = \frac{3}{7}s$

5. a) Using elimination, solve for r in the following system.

$4r + s = 10$

$2r + s = -44$

b) Using substitution, solve for r in the following system.

$s = \frac{4}{3}r$

$3s + r = 256$

Section 1.4 Warm-Up

1. Determine whether each sequence is arithmetic, geometric, or neither.

a) 0.6, 0.66, 0.666, …

b) 5, 6, 7, …

c) 4, –4, 4, …

d) $\frac{1}{4}, \frac{1}{16}, \frac{1}{64}, ...$

e) $\frac{17}{5}, \frac{12}{5}, \frac{7}{5}, ...$

2. For each sequence,

- determine r.
- write the next two terms.
- determine the general term t_n.

a) 2, –6, 18, …

b) $5, \frac{-10}{3}, \frac{20}{9}, \frac{-40}{27}, ...$

3. What is n in the sequence 2, 14, 98, $\cdots$, 4802? Justify your work.

4. What is r in each of the following?

a) $125 = \frac{1}{5}r^4$

b) $1, \frac{1}{6}, \frac{1}{36}, \cdots, \frac{1}{7776}$

5. If $t_2 = 28$ and $t_5 = 1792$, what are the values of t_1, r, and t_n?

Section 1.5 Warm-Up

1. Identify whether each series is arithmetic or geometric. Then, determine S_{18} to the nearest tenth, if appropriate.

a) $3 + \frac{5}{2} + 2 + ...$

b) $3 + \frac{3}{2} + \frac{3}{4} + ...$

c) $10 + 13 + 16 + \dots$

d) $12 + 24 + 48 + \dots$

2. Consider the series $1 - \frac{1}{3} + \frac{1}{9} - \frac{1}{27} + \cdots + \frac{1}{59\,049}$.

a) Determine t_1, r, and n.

b) Write the general form for t_n.

c) Determine the sum of the series, to the nearest hundredth.

3. Draw a 6 cm line and label the endpoints A and B. Locate the midpoint between points A and B and label it C. Locate the midopoint between points A and C and label it D. Suppose this process continues with points E and F, respectively.

a) Write a sequence that represents the process.

b) If the next point is included, determine the length of segment AG.

4. Write each fraction as a repeating decimal.

a) $\frac{2}{9}$

b) $\frac{23}{99}$

c) $\frac{47}{999}$

5. Simplify. Express each answer in fraction form.

a) $\frac{3}{4}\left(2 - \frac{4}{5}\right)^2$

b) $-\frac{2}{5}\left(1 + \frac{1}{6}\right)^3$

6. Evaluate. Express each answer to the nearest hundredth.

a) $\left(\frac{1}{2}\right)^4$

b) $\left(\frac{1}{2}\right)^6$

c) $\left(\frac{1}{2}\right)^8$

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Section 1.1 Extra Practice

1. Identify which of the following sequences are arithmetic. For each arithmetic sequence, state the values of t_1 and d, and the next three terms.

a) 4, 7, 10, 13, …

b) 12, 7, 2, –3, …

c) 5, 15, 45, 135, …

d) $x, x^2, x^3, x^4, \ldots$

e) $x, x + 2, x + 4, x + 6, \ldots$

2. Write the first four terms of each arithmetic sequence for the given values of t_1 and d.

a) $t_1 = -5, d = -2$

b) $t_1 = 10, d = -0.5$

c) $t_1 = 3, d = x$

d) $t_1 = \frac{7}{3}, d = \frac{1}{3}$

3. Given the general term, state the first four terms of each sequence. Then, graph t_n versus n.

a) $t_n = 13 - 3n$

b) $t_n = \frac{1}{2}n + 4$

4. Determine the general term and the 50th term for each arithmetic sequence.

a) 6, 10, 14, …

b) $3, 2\frac{1}{2}, 2, \ldots$

5. Determine the number of terms in each finite arithmetic sequence.

a) $-6, -3, 0, \cdots, 222$

b) $3\frac{1}{4}, 3\frac{3}{4}, 4\frac{1}{4}, \cdots, 15\frac{3}{4}$

6. Determine the unknown terms in each arithmetic sequence.

a) 4, ☐, ☐, 16

b) ☐, 8, ☐, ☐, 2

c) 20, ☐, ☐, ☐, ☐, –10

7. The 20th term of an arithmetic sequence is 107, and the common difference is 5. Determine the first term, the general term, and the 40th term of this sequence.

8. Use the two given terms to find t_1, d, and t_n for each arithmetic sequence.

a) $t_{11} = 25, t_{30} = 101$

b) $t_2 = 90, t_{51} = -57$

9. The terms $5 + x$, 8, and $1 + 2x$ are consecutive terms in an arithmetic sequence. Determine the value of x and state the three terms.

10. The triangular shapes are made from asterisks.

Figure 1 Figure 2 Figure 3

a) How many asterisks will be in the fourth triangle? the fifth triangle?

b) Write the general term for the sequence involving the number of asterisks in the triangles.

c) How many asterisks will be in the 20th diagram?

d) Which diagram will contain 126 asterisks?

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BLM 1–5

Section 1.2 Extra Practice

1. Determine the sum of each arithmetic series.

a) $14 + 10 + 6 + \cdots + (-86)$

b) $5 + 6.5 + 8 + \cdots + 26$

c) $\frac{3}{4} + 2 + \frac{13}{4} + \cdots + \frac{49}{2}$

2. For each arithmetic series, determine the indicated sum.

a) $4 + 9 + 14 + \ldots$; first 12 terms

b) $(-16) + (-14) + (-12) + \ldots$; first 17 terms

c) $x + 3x + 5x + \ldots$; first 20 terms

3. For each arithmetic series, determine the number of terms.

a) $3 + 7 + 11 + \cdots + t_n = 465$

b) $-2 - 5 - 8 - \cdots - t_n = -950$

c) $t_1 = 20$, $t_n = -40$, $S_n = -210$

4. For each arithmetic series, determine the 12th term and the 12th partial sum.

a) $3 - 1 - 5 - \ldots$

b) $\frac{3}{5} + \frac{7}{5} + \frac{11}{5} + \ldots$

5. Determine the sum of each arithmetic series, given the first and nth terms.

a) $t_1 = -3$, $t_{14} = 62$

b) $t_1 = \sqrt{3}$, $t_{10} = 18\sqrt{3}$

6. Determine the sum of all multiples of 7 between 1 and 1000.

7. In an arithmetic series, the third term is 24 and the sixth term is 51. What is the sum of the first 25 terms of the series?

8. The sum of the first eight terms of an arithmetic series is 176. The sum of the first nine terms is 216. Determine the first and ninth terms of the series.

9. The sum of the first n terms of an arithmetic series is $S_n = 3n^2 + 4n$.

a) Determine the first five partial sums.

b) Determine the first five terms of the series.

c) Use the formula to verify that the sum of the first five terms is equal to S_5.

10. A student is offered the opportunity to earn $6.00 for the first day, $11.00 for the second day, $16.00 for the third day, and so on, for 20 working days. Or, the student can accept $1000 for the whole job. Which offer pays more?

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BLM 1–6

Section 1.3 Extra Practice

1. Is each sequence geometric? If it is, state the common ratio and a formula to determine the general term in the form $t_n = t_1r^{n-1}$.

a) 11, 33, 99, 297, …

b) 6, 12, 18, 24, …

c) $\frac{1}{3}, \frac{2}{3}, \frac{4}{3}, \frac{8}{3}, \ldots$

d) 0.5, 0.2, 0.08, 0.032, …

2. Write the first four terms of each geometric sequence.

a) $t_1 = 7$, $r = -3$

b) $t_1 = -8$, $r = \frac{1}{2}$

c) $t_n = 3(0.6)^{n-1}$

d) $t_n = (-4)^n$

3. Determine the number of terms in each geometric sequence.

a) 4, 12, 36, ⋯, 78 732

b) $5\sqrt{2}$, 10, $10\sqrt{2}$, ⋯, 640

c) $t_1 = 5$, $r = -\frac{1}{2}$, $t_n = \frac{5}{64}$

d) $t_1 = \frac{1}{4}$, $r = 3$, $t_n = 44\ 286.75$

4. Determine the nth term of each geometric sequence.

a) $t_1 = 2$, $r = 7$

b) 6, –18, 54, –164, …

c) $t_1 = 7$, $t_5 = 1792$

d) $r = \frac{1}{4}$, $t_8 = \frac{1}{4}$

5. Determine the unknown terms in each geometric sequence.

a) 18, □, □, 6174

b) □, 4, □, □, 108

c) 5, □, □, □, 80

6. The first term of a geometric sequence is 0.1; the tenth term is 26 214.4. Determine the value of the common ratio.

7. Determine the first term, the common ratio, and an expression for the general term of each geometric sequence.

a) $t_5 = 900$, $t_7 = 0.09$

b) $t_3 = -1728$, $t_6 = 373\ 248$

c) $t_5 = 28$, $t_{11} = 1792$

d) $t_2 = 3$, $t_4 = 0.75$

8. The following sequences are geometric. What is the value of each variable?

a) $8x - 12$, 16, 64, 256, …

b) 25, 5, 1, $2y - 1$, …

9. For a geometric sequence $t_4 = 4x + 8$ and $t_7 = x - 4$. If the common ratio is $\frac{1}{2}$, what is the first term?

10. An excavating company has a digger that was purchased for $240 000. It is depreciating at 12% per year.

a) Determine the next three terms of this geometric sequence.

b) Determine the general term. Define your variables.

c) How much will the digger be worth in 7 years?

d) How long will it take before the equipment is worth less than $120 000?

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BLM 1–7

Section 1.4 Extra Practice

1. Determine whether each series is geometric. Justify your answers.

a) $5 + 6 + 7.2 + 8.64 + \ldots$

b) $3125 - 625 + 125 - 25 + \ldots$

c) $\frac{3}{4} + \frac{1}{2} + \frac{1}{3} + \frac{2}{9} + \ldots$

d) $2 + 3 + 5 + 8 + \ldots$

2. For each geometric series, state the values of t_1 and r. Then, determine each partial sum.

a) $0.43 + 0.0043 + 0.000\,043 + \ldots,\ (S_6)$

b) $5 - 5 + 5 - \ldots,\ (S_{10})$

c) $-100 + 50 - 25 + \ldots,\ (S_7)$

3. Determine the partial sum, S_n, for each geometric series described.

a) $t_1 = 50,\ r = 1.1,\ n = 4$

b) $t_1 = -4,\ r = 2,\ n = 10$

c) $t_n = (-5)(0.5)^{n-1},\ n = 5$

d) $t_n = (3)(2)^{n-1},\ n = 12$

4. Determine the partial sum, S_n, for each geometric series.

a) $2 + 6 + 18 + \cdots + 354\,294$

b) $t_1 = -3,\ r = -2,\ t_n = 6144$

c) $S_n = (-32)(0.75^n - 1),\ n = 6$

5. Determine the first term for each geometric series.

a) $S_n = 3932.4,\ t_n = 4915.2,\ r = -4$

b) $S_n = 292\,968,\ n = 8,\ r = 5$

6. Determine the number of terms in each geometric series.

a) $4 + 20 + 100 + \cdots + t_n = 15\,624$

b) $1792 - 896 + 448 - \cdots - t_n = 1197$

7. The fourth term of a geometric series is 30; the ninth term is 960. Determine the sum of the first nine terms.

8. The first term of a geometric sequence is 3. The sum of the first two terms of the series is 15 and the sum of the first three terms of the series is 63. Determine the common ratio.

9. Determine the first four terms of each geometric series.

a) $S_n = 5(3^n - 1)$

b) $S_n = -24(0.5^n - 1)$

10. A ball is dropped from the top of a 25-m ladder. In each bounce, the ball reaches a vertical height that is $\frac{3}{5}$ the previous vertical height. Determine the total vertical distance travelled by the ball when it contacts the ground for the sixth time. Express your answer to the nearest tenth of a metre.

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BLM 1–8

Section 1.5 Extra Practice

1. State whether each geometric series is convergent or divergent.

   a) $80 + 20 + 5 + \frac{5}{4} + \ldots$

   b) $-30 + 20 - \frac{40}{3} + \frac{80}{9} - \ldots$

   c) $t_1 = -5,\ r = \frac{1}{2}$

   d) $t_1 = \frac{1}{3},\ r = -2$

2. Determine the sum of each geometric series, if it exists.

   a) $t_1 = -4,\ r = \frac{4}{5}$

   b) $t_1 = 10,\ r = \frac{-2}{3}$

   c) $10 + 10\sqrt{3} + 30 + 30\sqrt{3} + \ldots$

   d) $\frac{5}{3} - \frac{5}{9} + \frac{5}{27} - \frac{5}{81} + \ldots$

   e) $8 + 8\left(\frac{2}{3}\right) + 8\left(\frac{2}{3}\right)^2 + 8\left(\frac{2}{3}\right)^3 + \ldots$

   f) $-2 - 2\left(\frac{-3}{4}\right) - 2\left(\frac{-3}{4}\right)^2 - 2\left(\frac{-3}{4}\right)^3 - \ldots$

3. Express each of the following as an infinite geometric series. Determine the sum of the series.

   a) $0.\overline{63}$

   b) $7.4\overline{5}$

   c) $0.123\ \overline{456}$

4. The general term of an infinite geometric series is $t_n = 7\left(\frac{1}{3}\right)^{n-1}$. Determine the sum of the series, if it exists.

5. The sum of an infinite geometric series is $\frac{10}{3}$ and the first term is 5. Determine the common ratio.

6. The sum of an infinite geometric series is $\frac{3\pi}{2}$ and the common ratio is $\frac{1}{2}$. Determine the first term.

7. A ball is dropped from a height of 2.0 m onto a floor. On each bounce the ball rises to 75% of the height from which it fell. Calculate the total distance the ball travels before coming to rest.

8. Determine the values of x such that the series $1 + x + x^2 + x^3 + \ldots$ has a sum.

9. The sum of an infinite geometric series is three times the first term. Determine the common ratio.

10. A new oil well produces 12 000 m^3/month of oil. Its production is known to be dropping by 2.5% each month.

    a) What is the total production in the first year?

    b) Determine the total production of the well.

Name: ______________________________ Date: ______________________

BLM 1–9

Chapter 1 Test

Multiple Choice

For #1 to 5, select the best answer.

1. What are the missing terms of the arithmetic sequence 4, $\square$, 14, $\square$, 24, $\square$?

A 10, 20, 30

B 9, 19, 29

C 5, 10, 15

D 8, 18, 28

2. While baking a cake, Dylan notices that each of his measuring cups is about half as big as the one before it. The largest (first) measuring cup is 250 mL. What is the approximate capacity of the fourth measuring cup?

A 125 mL

B 65 mL

C 30 mL

D 15 mL

3. The years in which the Commonwealth Games take place form an arithmetic sequence with a common difference of 4. In 1978, the Commonwealth Games were held in Edmonton, Alberta. In which of the following years could the Commonwealth Games be held again?

A 2011

B 2022

C 2033

D 2044

4. The sum of the first 20 terms of the arithmetic series 204 + 212 + 216 + ... is

A 11 200

B 7120

C 5680

D 5600

5. The sum of the first 11 terms of the geometric series 7 – 14 + 28 – … is

A 28 679

B 4 781

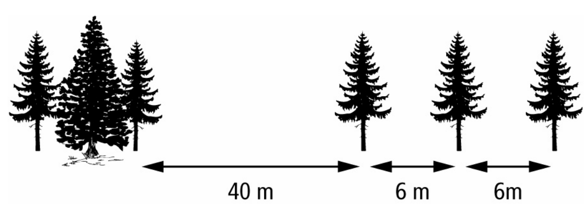
C –9 555

D –28 665

Short Answer

6. Gentry notices that the bank of lockers outside his math classroom are numbered 511, 513, 515, ..., 575. Determine the number of lockers in the set.

7. Brittany, a landscape designer, is setting out trees for planting. The 12 trees she needs are currently in one location, 40 m from the spot the first tree will be planted. The trees will be spaced 6 m apart. The cart she uses to transport the trees will only carry one tree at a time, so she must take the first tree to its spot, return for the second tree, take it to its spot, and so on. After Brittany takes all 12 trees to the correct spot and returns to the original location of the trees, how far will she have travelled, in total?



8. Determine the sum of the arithmetic series $9 + 21 + 33 + \cdots + 693$.

9. In an arithmetic sequence, $t_3 = 16$ and $t_7 = 40$.

a) Determine the common difference in the sequence.

b) Determine the first term in the sequence.

c) Determine t_{100}.

10. 5, $\square$, 405 is a geometric sequence.

a) Determine all possible values for the second term of this sequence.

b) Determine all possible general terms for this sequence.

11. The *n*th sum of a sequence is given by the formula $S_n = 1 - 4^n$.

a) Determine the first three terms of the sequence.

b) Decide whether the sequence is arithmetic or geometric. Determine the general term for the sequence.

Extended Response

12. Write a geometric series with a positive first term.

a) Find the sum of the first ten terms of your series.

b) Change the common ratio of your series so the sum of the first ten terms is the opposite sign, but the same value, as in part a). For example, if your sum was positive in part a), ensure that it is negative for part b).

c) Create a geometric series so that S_n is positive when n is odd, and S_n is negative when n is even. Justify your answer.

13. According to Statistics Canada, Chestermere, Alberta is one of the fastest growing communities in Canada. Between 2001 and 2006, the population grew at an average rate of about 8% per year.

a) The population of Chestermere in 2001 was 6462. Determine the population for the years 2002 through 2004, inclusive.

b) Write the general term for the geometric sequence that models the population of Chestermere, where n is the number of years starting in 2001.

c) Predict the population of Chestermere in the year 2020.

d) What assumption(s) did you make in your answer to part c)?

14. Write a sequence that is both arithmetic and geometric.

a) Prove that your sequence is arithmetic. Determine the general term of the sequence.

b) Prove that your sequence is geometric. Determine the general term of the sequence.

c) How many sequences could be both arithmetic and geometric? Justify your answer.

Chapter 1 BLM Answers

BLM 1–2 Chapter 1 Prerequisite Skills

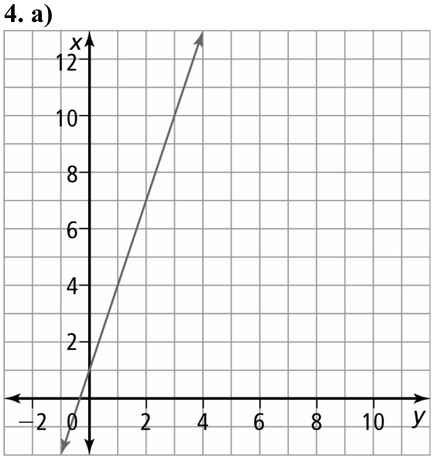
1. a) Non-linear. Each increase in the value of r increases the value of A by a different amount
b) Linear. Each increase in the value of x increases the value of y by the same amount, 5.
c) Non-linear. Each increase in the value of the first coordinate increases the value of the second coordinate by a different amount.
d) Linear. The same increase in the value of the first coordinate (2) increases the value of the second coordinate by the same amount, 5.
2. a)

Term Number	Value
1	9
2	16
3	23
4	30
5	37

b) $v = 7t + 2$ **c)** 499 **d)** $t = 19$
3. a)

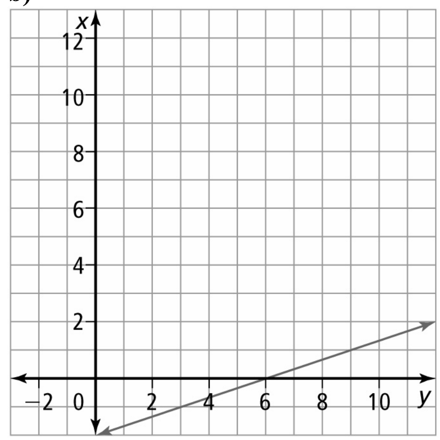
Term Number	Value
1	–4
2	–9
3	–14
4	–19
5	–24

b) $v = -5t + 1$
Substitute $t = 3$. The result should be -14.
$v = -5(3) + 1$
$v = -15 + 1$
$v = -14$
c) -244 **d)** $t = 18$
4. a)



$y = 3x + 1$

b)



$t = \frac{1}{3}s - 2$

5. a) $y = -2x + 6$ **b)** $y = -3x - 9$ **c)** $y = -\left(\frac{5}{6}\right)x + \frac{4}{3}$

d) $y = 6x - 4$ **e)** $y = 7x + 9$ **f)** $y = 2x - \frac{3}{4}$

6. a) 125 **b)** 1296 **c)** $\frac{1}{16}$ or 0.0625 **d)** $\frac{4}{9}$

7. a) -2 **b)** 3 **c)** $\frac{1}{3}$ **d)** $-\frac{2}{3}$

8. a) $\frac{1}{12^4}$ **b)** $\frac{t^3}{s^2}$ **c)** $8t^4$ **d)** x^6y^{30}

9. a)

Number of 2-min Intervals	Amount of Protactinium
0	1000
1	500
2	250
3	125
4	62.5
5	31.25

b) 12 min

BLM 1–3 Chapter 1 Warm-Up

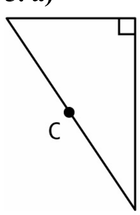
Section 1.1

1. a) The first term is 2. The common difference is 2.
b) The first term is 1. The common difference is 3.
c) The first term is 5. The common difference is 6.
2. a) $x = 13$ **b)** $x = -29$
3. a) $g(1) = -5$ **b)** $g(0) = -11$ **c)** $g(-3) = -29$
4. a) $x = 19\frac{1}{2}$ **b)** $x = 38$

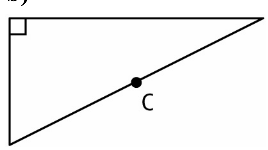
5. a) slope = 4, y-intercept = –1
b)

x	y
0	–1
1	3
2	7
3	11
4	15
5	19

Section 1.2
1. a) arithmetic sequence, $t_1 = 2$, $d = 2$
b) not arithmetic sequence
c) arithmetic, $t_1 = 1$, $d = 3$
d) arithmetic, $t_1 = -6$, $d = 5$
2. a) t_n is the general term, t_1 is the first term, n is the number of terms, and d is the common difference.
b) $t_{26} = 78$ **c)** $t_1 = -5$ **d)** $t_n = 2 + 4(n - 1)$
3. a) $y = 6x$ **b)** $y = 2x + 1$ **c)** $y = 18 + 36x$
4. $x = \frac{13}{19}$, $y = \frac{84}{57}$
5. a)



b)



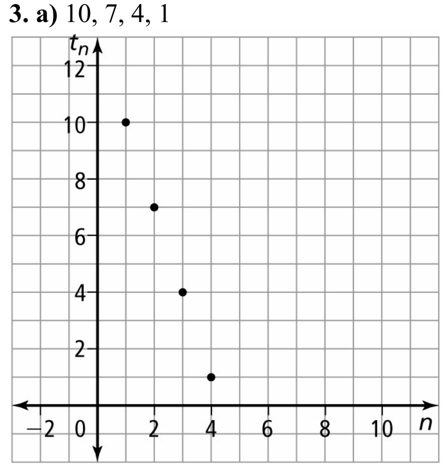
Section 1.3
1. a) arithmetic, $t_1 = 2$, $d = 2$
b) not arithmetic because you multiply by 2 to find each successive term
c) arithmetic, $t_1 = 5$, $d = -2$
d) not arithmetic because you multiply by $\frac{1}{2}$ to find each successive term
2. a) $t_n = 3n - 9$ **b)** $S_{10} = 75$
3. a) 48 cm × 38.4 cm **b)** 15 cm × 12 cm
4. a) 3.56 **b)** 1.49 **c)** 1.51 **d)** $s = 11.67$
5. a) $r = 27$ **b)** $r = 51.2$

Section 1.4
1. a) neither **b)** arithmetic **c)** geometric
d) geometric **e)** arithmetic
2. a) $r = -3$; –54, 162; $t_n = 2(-3)^{n-1}$
b) $r = -\frac{2}{3}$; $\frac{80}{81}$, $\frac{-160}{243}$; $t_n = 5\left(\frac{-2}{3}\right)^{n-1}$
3. Solve $2(7)^{n-1} = 4802$ to get $n = 5$.
4. a) $r = 5$ **b)** $r = \frac{1}{6}$
5. $t_1 = 7$, $r = 4$, $t_n = 7(4)^{n-1}$

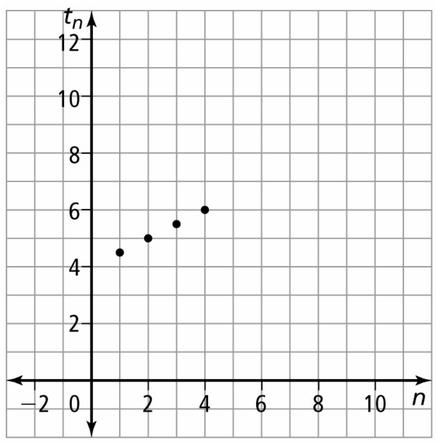
Section 1.5
1. a) arithmetic, $S_{18} = -\frac{45}{2}$ or –22.5
b) geometric, $S_{18} = 6.0$ **c)** arithmetic, $S_{18} = 639$
d) geometric, $S_{18} = 3\ 145\ 716$
2. a) $t_1 = 1$, $r = -\frac{1}{3}$ and $n = 11$
b) $t_n = 1\left(-\frac{1}{3}\right)^{n-1}$ **c)** $S_{11} = 0.75$
3. a) 6, 3, $\frac{3}{2}$, $\frac{3}{4}$, $\frac{3}{8}$
b) The length from A to G would be $\frac{3}{16}$ cm or 0.1875 cm.
4. a) $0.\overline{2}$ **b)** $0.\overline{23}$ **c)** $0.\overline{047}$
5. a) $\frac{27}{25}$ **b)** $-\frac{343}{540}$
6. a) 0.06 **b)** 0.02 **c)** 0.00

BLM 1–4 Section 1.1 Extra Practice

1. a) arithmetic; $t_1 = 4$, $d = 3$; 16, 19, 22
b) arithmetic; $t_1 = 12$, $d = -5$; –8, –13, –18
c) not arithmetic **d)** not arithmetic
e) arithmetic; $t_1 = x$, $d = 2$; $x + 8$, $x + 10$, $x + 12$
2. a) –5, –7, –9, –11 **b)** 10, 9.5, 9, 8.5
c) 3, $3 + x$, $3 + 2x$, $3 + 3x$ **d)** $\frac{7}{3}$, $\frac{8}{3}$, $\frac{9}{3}$, $\frac{10}{3}$
3. a) 10, 7, 4, 1



b) $4\frac{1}{2}, 5, 5\frac{1}{2}, 6$



4. a) $t_n = 4n + 2$; $t_{50} = 202$ **b)** $t_n = \frac{7}{2} - \frac{1}{2}n$; $t_{50} = -21\frac{1}{2}$

5. a) 77 **b)** 26

6. a) 4, $\boxed{8}$, $\boxed{12}$, 16 **b)** $\boxed{10}$, 8, $\boxed{6}$, $\boxed{4}$, 2

c) 20, $\boxed{14}$, $\boxed{8}$, $\boxed{2}$, $\boxed{-4}$, −10

7. $t_1 = 12$, $t_n = 5n + 7$, $t_{40} = 207$

8. a) $t_1 = -15$, $d = 4$, $t_n = 4n - 19$

b) $t_1 = 93$, $d = -3$, $t_n = 96 - 3n$

9. $x = \frac{10}{3}$; $\frac{25}{3}$, 8, $\frac{23}{3}$

10. a) 15, 18 **b)** $t_n = 3n + 3$

c) 63 asterisks **d)** 41st diagram

BLM 1–5 Section 1.2 Extra Practice

1. a) −936 **b)** 232.5 **c)** 252.5 or $252\frac{1}{2}$

2. a) 378 **b)** 0 **c)** $400x$

3. a) 15 **b)** 25 **c)** 21

4. a) $t_{12} = -41$, $S_{12} = -228$ **b)** $t_{12} = \frac{47}{5}$, $S_{12} = 60$

5. a) 413 **b)** $95\sqrt{3}$

6. 71 071 **7.** 2850 **8.** $t_1 = 8$, $t_9 = 40$

9. a) $S_1 = 7$, $S_2 = 20$, $S_3 = 39$, $S_4 = 64$, $S_5 = 95$

b) $T_1 = 7$, $T_2 = 13$, $T_3 = 19$, $T_4 = 25$, $T_5 = 31$

c) $S_5 = 3(5)^2 + 4(5) = 95$

10. $6 + 11 + 16 + \cdots + t_{20} = \$1070$. Therefore, the arithmetic series method pays more money.

BLM 1–6 Section 1.3 Extra Practice

1. a) geometric, $r = 3$, $t_n = 11(3)^{n-1}$

b) not geometric **c)** geometric, $r = 2$, $t_n = \frac{1}{3}(2)^{n-1}$

d) geometric, $r = 0.4$, $t_n = (0.5)(0.4)^{n-1}$

2. a) 7, −21, 63, −189

b) −8, −4, −2, −1

c) 3, 1.8, 1.08, 0.648

d) −4, 16, −64, 256

3. a) 10 **b)** 14 **c)** 7 **d)** 12

4. a) $t_n = 2(7)^{n-1}$ **b)** $t_n = 6(-3)^{n-1}$

c) $t_n = 7(4)^{n-1}$ **d)** $t_n = 4096\left(\frac{1}{4}\right)^{n-1}$

5. a) 126, 882 **b)** $\frac{4}{3}$, 12, 36 **c)** ±10, 20, ±40

6. 4

7. a) $t_1 = 9 \times 10^{10}$, $r = \pm 0.01$, $t_n = (9 \times 10^{10})(\pm 0.01)^{n-1}$

b) $t_1 = -48$, $r = -6$, $t_n = (-48)(-6)^{n-1}$

c) $t_1 = 1.75$, $r = \pm 2$, $t_n = (1.75)(\pm 2)^{n-1}$

d) $t_1 = \pm 6$, $r = \pm 0.5$, $t_n = (6)(\pm 0.5)^{n-1}$

8. a) $x = 2$ **b)** $y = \frac{6}{10}$ or $\frac{3}{5}$

9. 384

10. a) \$211 200, \$185 856, \$163 553

b) $t_n = 240\,000(0.88)^{n-1}$, t_n = value of digger, in dollars, $n - 1$ = years since purchase

c) \$98 082 **d)** 6 years

BLM 1–7 Section 1.4 Extra Practice

1. a) geometric series, the common ratio is 1.2

b) geometric series, the common ratio is −0.2

c) geometric series, the common ratio is $\frac{2}{3}$

d) not geometric, no common ratio

2. a) $t_1 = 0.43$, $r = 0.01$, $S_6 = \frac{43}{99}$

b) $t_1 = 5$, $r = -1$, $S_{10} = 0$

c) $t_1 = -100$, $r = -0.5$, $S_7 = \frac{-1075}{16}$

3. a) 232.05 **b)** −4092 **c)** $\frac{-155}{16}$ **d)** 12 285

4. a) 531 440 **b)** 4095 **c)** $\frac{3367}{128}$

5. a) 1.2 **b)** 3

6. a) 6 **b)** 9

7. 1916.25 **8.** 4

9. a) 10, 30, 90, 270 **b)** 12, 6, 3, 1.5

10. 94.2 m

BLM 1–8 Section 1.5 Extra Practice

1. a) convergent **b)** convergent **c)** convergent **d)** divergent

2. a) −20 **b)** 6 **c)** does not exist **d)** $\frac{5}{4}$ **e)** 24 **f)** $-\frac{8}{7}$

3. a) $\frac{63}{100}+\frac{63}{(100)^2}+\frac{63}{(100)^3}+\cdots=\frac{7}{11}$

b) $7.4+\frac{5}{100}+\frac{5}{1000}+\frac{5}{10\,000}+\cdots=7\frac{41}{90}$

c)
$0.123+\frac{456}{(1000)^2}+\frac{456}{(1000)^3}+\frac{456}{(1000)^4}+\cdots=\frac{41\,111}{333\,000}$

4. $\frac{21}{2}$ **5.** $-\frac{1}{2}$ **6.** $\frac{3}{4}\pi$ **7.** 14 m **8.** $|x|<1$

9. $\frac{2}{3}$ **10. a)** 125 761 m^3 **b)** 480 000 m^3

BLM 1–9 Chapter 1 Test

1. B **2.** C **3.** B **4.** D **5.** B
6. There are 33 lockers.
7. Brittany travelled 1752 m.
8. 20 358
9. a) $d = 6$ **b)** $t_1 = 4$ **c)** $t_{100} = 598$
10. a) $r = 9$ or -9 **b)** $t_n = 5(9)^{n-1}$ or $t_n = 5(-9)^{n-1}$
11. a) –3, –12, –48
b) The sequence is geometric. $t_n = -3(4)^{n-1}$
12. a) Example, for the series
$2 + 10 + 50 + ...,$ $S_{10} = 4\,882\,812$.
b) Answers will vary. Students need to change the sign of the first term, while leaving the common ratio unchanged. In the example above, the series becomes $-2 - 10 - 50 - ...,$ $S_{10} = 4\,882\,812$.
c) Answers will vary. Correct answers must have positive first term and negative common ratio.
For example, 2 – 10 + 50 – ….
13. a) 6979, 7537, 8140 **b)** $t_n = 6462(1.08)^{n-1}$
c) 27 888
d) Answers will vary. For example, we assume that population continues to grow at the same rate.
14. Answers will vary, however will all be in the form $k, k, k, \ldots$, where k is a real number.
a) Note that $d = 0$, so $t_n = k$.
b) Note that $r = 1$, so $t_n = k$.
c) There are infinitely many such sequences, but all sequences will have the same form.