NAME _____ DATE _____ PERIOD ____

7-6 Practice: Skills

Sequences

Describe each pattern. Then find the next two numbers in the sequence.

1. 6, 10, 14, 18, ...

2. 31, 26, 21, 16, ...

3. 12, 24, 48, 96, ...

4. 16, 8, 4, 2, ...

5. 108, 36, 12, 4, ...

6. 1, $1\frac{1}{5}$, $1\frac{2}{5}$, $1\frac{3}{5}$, ...

7. $\frac{1}{64}$, $\frac{1}{32}$, $\frac{1}{16}$, $\frac{1}{8}$, ...

8. 43, 38, 33, 28, ...

9. 63, 56, 49, 42, ...

10. 2, 15, 28, 41, ...

11. 5, 20, 35, 50, ...

12. 1, $1\frac{2}{3}$, $2\frac{1}{3}$, 3, ...

13. 4, 12, 36, 108, ...

14. 1, 5, 25, 125, ...

Find the missing number in each sequence.

15. 54, ___?___, 42, 36, ...

16. $\frac{1}{6}$, $\frac{1}{3}$, ___?___, $\frac{2}{3}$, ...

17. ___?___, 12, 48, 192, ...

18. $\frac{1}{81}$, $\frac{1}{27}$, ___?___, $\frac{1}{3}$, ...

19. 16, 4, ___?___, $\frac{1}{4}$, ...

20. ___?___, 1, 5, 25, ...

Lesson 7–6

Lesson 7-6

Example 1 Extend a Sequence by Adding
Describe the pattern in the sequence 23, 30, 37, 44, … . Then find the next two numbers in the sequence.

In this sequence, 7 is added to each number. The next two numbers are 44 + 7, or 51, and 51 + 7, or 58.

Example 2 Extend a Sequence by Multiplying
Describe the pattern in the sequence 3, 12, 48, 192, … . Then find the next two numbers in the sequence.

Each number is multiplied by 4. The next two numbers are 192 × 4, or 768, and 768 × 4, or 3,072.

Example 3 Use Sequences to Solve a Problem
FLORAL DISPLAY Ruby is creating a floral display in which she uses 5 pots of daffodils in the first row of the display, 11 pots in the second row, and 17 pots in the third row. If Ruby continues this pattern, how many pots will be in the fifth row of the display?

Write the sequence. Find the fifth number.

5, 11, 17, …

In this sequence, 6 is added to each number. The fourth row will have 17 + 6, or 23 pots, and the fifth row will have 23 + 6, or 29 pots of daffodils.

Lesson 1-4

Example 1 Write Powers and Products
Write $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$ using an exponent. Then find the value of the power.

The base is 2. Since 2 is a factor five times, the exponent is 5.
$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2^5$
$= 32$

Example 2 Write Powers and Products
Write 3^4 as a product. Then find the value of the product.

The base is 3. The exponent is 4. So, 3 is a factor four times.
$3^4 = 3 \cdot 3 \cdot 3 \cdot 3$
$= 81$

Example 3 Use Powers to Solve a Problem
ZOO ANIMALS The number of pounds of raw vegetables fed to animals at the local zoo each day can be written as 3^7 pounds. What is this number?

Write 3^7 as a product. Then find the value of the product.
$3^7 = 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$
$= 2{,}187$

So, the animals eat 2,187 pounds of raw vegetables each day.

Example 4 Write Prime Factorization Using Exponents
Write the prime factorization of 108 using exponents.

The prime factorization of 108 is $2 \times 2 \times 3 \times 3 \times 3$. This can be written as $2^2 \times 3^3$.

NAME _____ DATE _____ PERIOD ____

7-6 Study Guide and Intervention

Sequences

A **sequence** is a list of numbers in a specific order that follows a pattern or rule.

EXAMPLE 1 **Describe the pattern in the sequence 41, 37, 33, 29, ... Then find the next two numbers in the sequence.**

$$41,\ 37,\ 33,\ 29, \ldots$$
$$-4\ \ -4\ \ -4$$

In this sequence, 4 is subtracted from each number.
The next two numbers are $29 - 4$, or 25, and $25 - 4$, or 21.

EXAMPLE 2 **Describe the pattern in the sequence 243, 81, 27, 9, ... Then find the next two numbers in the sequence.**

$$243,\ 81,\ 27,\ 9, \ldots$$
$$\times\frac{1}{3}\ \ \times\frac{1}{3}\ \ \times\frac{1}{3}$$

In this sequence, each number is multiplied by $\frac{1}{3}$.

The next two numbers are $9 \times \frac{1}{3}$, or 3, and $3 \times \frac{1}{3}$, or 1.

EXERCISES

Describe each pattern. Then find the next two numbers in the sequence.

1. 72, 77, 82, 87, ...

2. 3, 6, 12, 24, ...

3. 32, 29, 26, 23, ...

4. $14\frac{1}{2}$, 14, $13\frac{1}{2}$, 13, $12\frac{1}{2}$, ...

5. $1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \ldots$

6. $3, 4\frac{1}{2}, 6, 7\frac{1}{2}, \ldots$

Find the missing number in each sequence.

7. ____, 75, 50, 25, ...

8. $17\frac{1}{3}, 18\frac{2}{3}, 20,$ ____, $22\frac{2}{3}, \ldots$

NAME _____ DATE _____ PERIOD _____

7-6 Practice: Skills

Sequences

Describe each pattern. Then find the next two numbers in the sequence.

1. 6, 10, 14, 18, ...

2. 31, 26, 21, 16, ...

3. 12, 24, 48, 96, ...

4. 16, 8, 4, 2, ...

5. 108, 36, 12, 4, ...

6. 1, $1\frac{1}{5}$, $1\frac{2}{5}$, $1\frac{3}{5}$, ...

7. $\frac{1}{64}$, $\frac{1}{32}$, $\frac{1}{16}$, $\frac{1}{8}$, ...

8. 43, 38, 33, 28, ...

9. 63, 56, 49, 42, ...

10. 2, 15, 28, 41, ...

11. 5, 20, 35, 50, ...

12. 1, $1\frac{2}{3}$, $2\frac{1}{3}$, 3, ...

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Find the missing number in each sequence.

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18. $\frac{1}{81}$, $\frac{1}{27}$, ___?___, $\frac{1}{3}$, ...

19. 16, 4, ___?___, $\frac{1}{4}$, ...

20. ___?___, 1, 5, 25, ...

Lesson 7–6

NAME _____ DATE _____ PERIOD ____

7-6

Practice: Word Problems

Sequences

1. SPORTS Thomas is getting in shape for track. He is starting with a 2 mile run and will increase the run by $\frac{1}{2}$ mile each week for 4 weeks. What will his distance be for the second, third, and fourth weeks?

2. WATER Kevin is pumping water from a small pond into a water tank. At 9 A.M. the water level was 2 inches. At 11 A.M. it was $3\frac{1}{2}$ inches. At 1 P.M. it was 5 inches. If the pattern continues, what will the level be at 3 P.M.? Explain.

3. BACKPACKING A group of backpackers started with 5 pounds of cheese. On the second day they had only $2\frac{1}{2}$ pounds. On the third day they had $1\frac{1}{4}$ pounds. If the pattern continues, how much will they have on the fourth day? Explain.

4. FROGS The frog population in a Japanese garden is growing at an alarming rate. The counts taken show there were 14 frogs to start, then 28, then 56, then 112. If they continue to grow at this rate, what will the next count be? Explain.

5. MONEY James borrowed $315 from his parents for a snowboard. He agreed to pay them back in monthly payments. In February he owed $265. In March he owed $215. In April he owed $165. What are his monthly payments? How much will he owe in August?

6. TRAVEL Jessica is on a road trip. At noon she still had 372 miles to go. At 1 P.M. she had 307 miles to go. At 2 P.M. she had 242 miles to go. At this rate, how many miles will Jessica have left to go at 5 P.M.? Explain.

Lesson 1-4

Example 1 Write Powers and Products
Write $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$ using an exponent. Then find the value of the power.

The base is 2. Since 2 is a factor five times, the exponent is 5.
$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2^5$
$= 32$

Example 2 Write Powers and Products
Write 3^4 as a product. Then find the value of the product.

The base is 3. The exponent is 4. So, 3 is a factor four times.
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$= 81$

Example 3 Use Powers to Solve a Problem
ZOO ANIMALS The number of pounds of raw vegetables fed to animals at the local zoo each day can be written as 3^7 pounds. What is this number?

Write 3^7 as a product. Then find the value of the product.
$3^7 = 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$
$= 2{,}187$

So, the animals eat 2,187 pounds of raw vegetables each day.

Example 4 Write Prime Factorization Using Exponents
Write the prime factorization of 108 using exponents.

The prime factorization of 108 is $2 \times 2 \times 3 \times 3 \times 3$. This can be written as $2^2 \times 3^3$.

Name _____ Date _____ Class _____

LESSON 1-7

Puzzles, Twisters & Teasers

Have You Heard?

Did you hear about the student who tried using a broken calculator to evaluate $29^7 + 13^4 + 5^8$?

Complete each sequence. Use the decoder below to find the letter that corresponds to the answer for each exercise. Place each letter above it's corresponding exercise number below to complete the answer to the puzzle.

1. 3, 6, 9, 12, _____

2. 8, 10, 12, 14, 16, _____

3. 8, 16, _____, 32, 40, 48

4. _____, 10, 15, 20, 25, 30

5. 20, 16, 12, 8, 4, _____

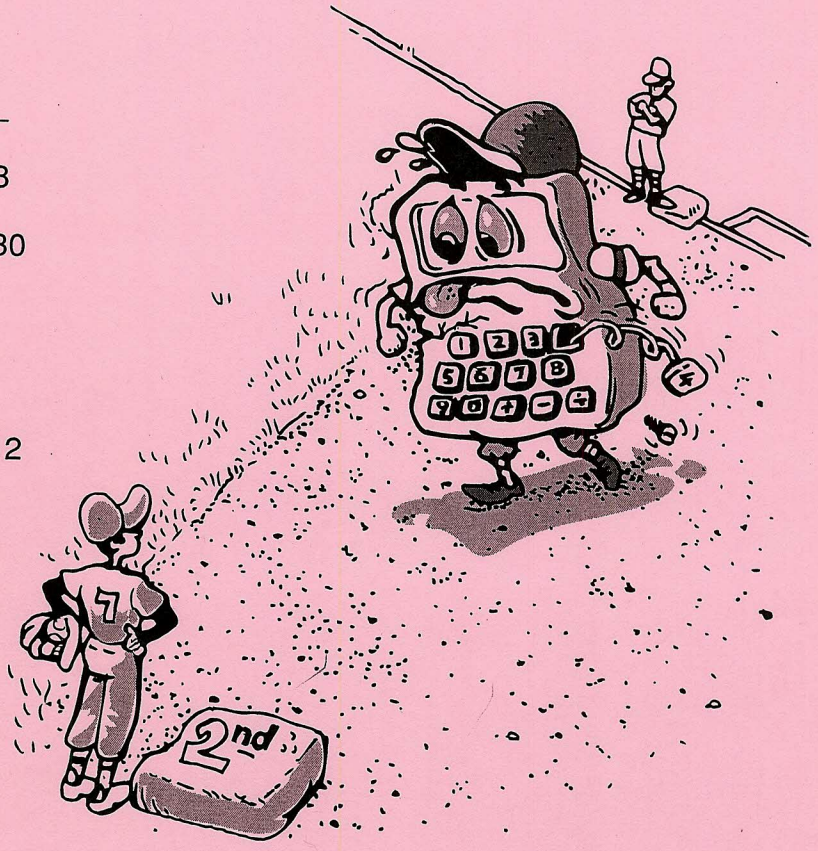
6. 0, 6, _____, 18, 24, 30

7. _____, 20, 18, 16, 14, 12

8. 1, 2, 4, 8, 16, _____

9. 7, 14, 21, _____, 35

10. 3, _____, 12, 24, 48



0 = B	18 = S
5 = Y	22 = E
6 = C	24 = A
12 = O	28 = I
15 = N	32 = D

He couldn't even reach _____ _____ _____ _____ _____ _____

2 7 10 6 1 8

_____ _____ _____ _____.

5 3 2 7

Name _____ Date _____ Class _____

LESSON 1-7

Practice A

Patterns and Sequences

Choose the sequence that matches each pattern.

1. Start with 12; subtract 2.

A 2, 4, 6, 8, 10, 12, ...

B 12, 11, 10, 9, 8, 7, ...

C 12, 14, 16, 18, 20, ...

D 12, 10, 8, 6, 4, 2, ...

2. Start with 3; multiply by 2.

F 3, 5, 7, 9, 11, ...

G 3, 6, 12, 24, 48, ...

H 2, 6, 18, 54, 162, ...

J 3, 4, 5, 6, 7, 8, 9, ...

3. Start with 5; add 4.

A 5, 4, 3, 2, 1, ...

B 5, 9, 13, 17, 21, ...

C 5, 10, 15, 20, 25 ...

D 4, 9, 14, 19, 24, ...

4. Start with 1; multiply by 10.

F 1, 10, 100, 1,000, ...

G 1, 10, 20, 30, 40, ...

H 10, 100, 1,000, 10,000, ...

J 10, 20, 30, 40, 50, ...

Identify a pattern in each sequence.

5. 1, 4, 7, 10, 13, ... _____

6. 15, 13, 11, 9, ... _____

7. 5, 10, 15, 20, ... _____

8.

Position	1	2	3	4	5	6	7
Value of Term	10	20	30	40	50	60	70

Name the next three terms in each sequence.

9. 1, 6, 11, 16, 21, ☐, ☐, ☐, ... _____

10. 2, 4, 6, 8, 10, ☐, ☐, ☐, ... _____

11.

Position	1	2	3	4	5	6	7
Value of Term	50	45	40	35	30	25	20

12. The temperature was 79°F on Friday, 76°F on Saturday, and 73°F on Sunday. If this weather pattern continues, what will the temperature be on Monday?

_____

13. Tony's Cafe sells four sizes of pizza. The first three sizes are 8 inches, 10 inches, and 12 inches. If this pattern of size continues, what is the largest size pizza the cafe sells?

_____

Name _____ Date _____ Class _____

LESSON 1-7

Practice B

Patterns and Sequences

Identify a pattern in each sequence and then find the missing terms.

1. 4, 8, 16, 32, ☐, ☐, ☐, ...

_____

2. 100, 95, 90, 85, ☐, ☐, ☐, ...

_____

3. 8, 20, 32, 44, ☐, ☐, ☐, ...

_____

4. 6, 12, 18, 24, ☐, ☐, ☐, ...

_____

5. 9, 18, 27, 36, ☐, ☐, ☐, ...

_____

6. 3, 6, 12, 24, ☐, ☐, ☐, ...

_____

7.

Position	1	2	3	4	5	6	7
Value of Term	5	10	20	40			

_____

8. 300, 250, ☐, ☐, 100, ☐, 0, ...

_____

9. 1, 15, ☐, 43, 57, ☐, 85, 99, ...

_____

10. 7, ☐, 21, 28, ☐, ☐, ☐, 56, ...

_____

11. 9, ☐, 13, ☐, ☐, ☐, 21, 23, ...

_____

12.

Position	1	2	3	4	5	6	7
Value of Term	3	12	21	30			

_____

13. A forest ranger in Australia took measurements of a eucalyptus tree for the past 3 weeks. The tree was 12 inches tall the first week, 19 inches the second week, and 26 inches the third week. If this growth pattern continues, how tall will the tree be next week?

_____

14. Maria puts the same amount of money in her savings account each month. She had $450 in the account in April, $600 in May, and $750 in June. If she continues her savings pattern, how much money will she have in the account in July?

_____

Name _____ Date _____ Class _____

LESSON 1-7

Practice C

Patterns and Sequences

Identify a pattern in each sequence, and then find the missing terms.

1. 13, 17, 21, 25, ☐, ☐, ☐, ...

_____

2. 48, 45, 42, 39, ☐, ☐, ☐, ...

_____

3. 1,600, 800, 400, 200, ☐, ☐, ☐, ...

_____

4. 1, 3, 9, 27, ☐, ☐, ☐, ...

_____

5.

Position	1	2	3	4	5	6	7
Value of Term	19	38	57	76			

_____

Identify a pattern in each sequence. Name the missing terms.

6. 2, ☐, ☐, 16, 32, ☐, ...

_____

7. 8, ☐, 24, ☐, 40, ☐, 56, ...

_____

8.

Position	1	2	3	4	5	6	7
Value of Term	4	12	14	42			

_____

9. The sequence 1, 1, 2, 3, 5, 8, 13, ... is called the Fibonacci Sequence. Identify the pattern in the sequence, and name the next three terms.

_____

_____

10. The pattern below shows a special sequence called triangular numbers. Draw the next figure in the pattern, and name the next triangular number in the sequence.

1 3 6 _____

Name _____ Date _____ Class _____

LESSON 1-7

Puzzles, Twisters & Teasers

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Complete each sequence. Use the decoder below to find the letter that corresponds to the answer for each exercise. Place each letter above it's corresponding exercise number below to complete the answer to the puzzle.

1. 3, 6, 9, 12, _____

2. 8, 10, 12, 14, 16, _____

3. 8, 16, _____, 32, 40, 48

4. _____, 10, 15, 20, 25, 30

5. 20, 16, 12, 8, 4, _____

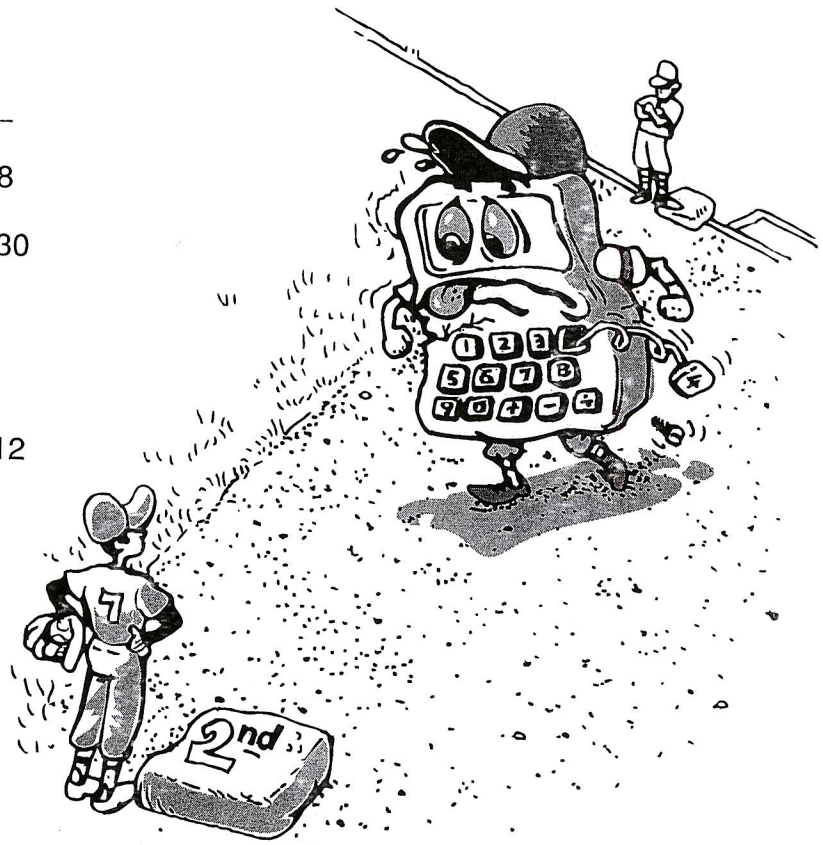
6. 0, 6, _____, 18, 24, 30

7. _____, 20, 18, 16, 14, 12

8. 1, 2, 4, 8, 16, _____

9. 7, 14, 21, _____, 35

10. 3, _____, 12, 24, 48



0 = B	18 = S
5 = Y	22 = E
6 = C	24 = A
12 = O	28 = I
15 = N	32 = D

He couldn't even reach _____ _____ _____ _____ _____ _____

2 7 10 6 1 8

_____ _____ _____ _____.

5 3 2 7

Name _____ Date _____ Class _____

LESSON 1-7

Reteach

Patterns and Sequences

Find the next three numbers in the sequence.

8, 12, 16, 20, 24, ☐, ☐, ☐, ...

Step 1: Look at pairs of numbers to find the pattern.

8, 12, 16, 20, 24, ☐, ☐, ☐, ...

8 + 4 = 12 12 + 4 = 16 16 + 4 = 20

The pattern is to add 4.

Step 2: Use the pattern to name the next three numbers.

24 + 4 = 28 28 + 4 = 32 32 + 4 = 36

The next three numbers are 28, 32, and 36.

Find the next three numbers in each sequence.

1. 5, 8, 6, 9, 7 ☐, ☐, ☐, ... _____

2. 90, 80, 70, 60, ☐, ☐, ☐, ... _____

3. 2, 8, 4, 16, ☐, ☐, ☐, ... _____

4. 10, 14, 18, 22, ☐, ☐, ☐, ... _____

5. 13, 21, 29, 37, ☐, ☐, ☐, ... _____

6. 24, 12, 16, 8, ☐, ☐, ☐, ... _____

7. 14, 12,10, 8, ☐, ☐, ☐, ... _____

8. 1, 7, 13, 19, ☐, ☐, ☐, ... _____

9. 1, 3, 6, 10, ☐, ☐, ☐, ... _____

10. 40, 38, 36, ☐, ☐, ☐, ... _____

11. 54, 45, 36, ☐, ☐, ☐, ... _____

12. 10, 25, 40, ☐, ☐, ☐, ... _____

13. 36, 29, 22, ☐, ☐, ☐, ... _____

14. 18, 36, 72, ☐, ☐, ☐, ... _____

Name _____ Date _____ Class _____

LESSON 1-7

Reading Strategies

Sequence

When a story has several parts, such as *Star Wars,* you want to watch them in order, or in **sequence.** When a set of numbers is **in order,** it is called a **sequence.** A sequence of numbers may have a special pattern. When we talk about the pattern, each number in the sequence is called a **term.**

Read each term of the sequence below. Note how the numbers change from one term to the next. What do you think is the pattern in this sequence?

1st Term	2nd Term	3rd Term	4th Term
12	24	36	48
	+12	+12	+12

→ 12 is added to each term.

The pattern for this sequence of terms is + 12. More terms can be added to a sequence by continuing the pattern.

4th Term	**5th Term**	**6th Term**	**7th Term**
48	60	72	84
	+12	+12	+12

→ the **5th term** is **60**
→ the **6th term** is **72**
→ the **7th term** is **84**

Use this sequence to answer Exercises 1–6:

78 77 75 72 68

1. What is the 3rd term in the sequence? _____

2. What change occurs between the 1st term and 2nd term?

_____

3. What change occurs between the 2nd term and the 3rd term?

_____

4. What change occurs between the 3rd term and the 4th term?

_____

5. Write a rule to describe how to find each term in the sequence.

_____

_____

6. Identify the 6th, 7th, and 8th terms in this sequence.

_____

NAME _____ DATE _____ PERIOD ____

7-6 Study Guide and Intervention

Sequences

A **sequence** is a list of numbers in a specific order that follows a pattern or rule.

EXAMPLE 1 **Describe the pattern in the sequence 41, 37, 33, 29, ... Then find the next two numbers in the sequence.**

41, 37, 33, 29, ...
-4 -4 -4

In this sequence, 4 is subtracted from each number.
The next two numbers are $29 - 4$, or 25, and $25 - 4$, or 21.

EXAMPLE 2 **Describe the pattern in the sequence 243, 81, 27, 9, ... Then find the next two numbers in the sequence.**

243, 81, 27, 9, ...
$\times \frac{1}{3}$ $\times \frac{1}{3}$ $\times \frac{1}{3}$

In this sequence, each number is multiplied by $\frac{1}{3}$.

The next two numbers are $9 \times \frac{1}{3}$, or 3, and $3 \times \frac{1}{3}$, or 1.

EXERCISES

Describe each pattern. Then find the next two numbers in the sequence.

1. 72, 77, 82, 87, ...

2. 3, 6, 12, 24, ...

3. 32, 29, 26, 23, ...

4. $14\frac{1}{2}$, 14, $13\frac{1}{2}$, 13, $12\frac{1}{2}$, ...

5. $1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}$, ...

6. $3, 4\frac{1}{2}, 6, 7\frac{1}{2}$, ...

Find the missing number in each sequence.

7. ____, 75, 50, 25, ...

8. $17\frac{1}{3}, 18\frac{2}{3}, 20$, ____, $22\frac{2}{3}$, ...

NAME _____ DATE _____ PERIOD ____

7-6

Practice: Word Problems

Sequences

1. SPORTS Thomas is getting in shape for track. He is starting with a 2 mile run and will increase the run by $\frac{1}{2}$ mile each week for 4 weeks. What will his distance be for the second, third, and fourth weeks?

2. WATER Kevin is pumping water from a small pond into a water tank. At 9 A.M. the water level was 2 inches. At 11 A.M. it was $3\frac{1}{2}$ inches. At 1 P.M. it was 5 inches. If the pattern continues, what will the level be at 3 P.M.? Explain.

3. BACKPACKING A group of backpackers started with 5 pounds of cheese. On the second day they had only $2\frac{1}{2}$ pounds. On the third day they had $1\frac{1}{4}$ pounds. If the pattern continues, how much will they have on the fourth day? Explain.

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